# COMPUTERWORLD

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# IBM 370 Stresses Compatibility, More Power

## Medium, Large User Target of 155, 165

By Frank Piasta
CW Staff Writer

NEW YORK – IBM last week stressed compatibility and more power for users when it introduced the first two members of its latest family of computers.

The System/370, which industry observers consider more evolutionary than revolutionary, should appeal to medium and large 360 users.

Ties with System/360 are strong. The 370 is hardware and software compatible with the older system. It can use almost all of the peripherals currently offered with the 360.

With the usual disclaimer concerning time and peripheral dependancy, all software written for the 360 may be used, including DOS and OS, IBM said.

Two models were introduced. The 155, for the user of medium-scale systems, is intended by IBM as a step-up from the 40 and 50 models of the 360. The larger, more powerful 165 is meant to appeal to the users of current 65s and 75s as an easy method of increasing their computing power.

A very real increase in power is represented by the 370 models. The 155 is described by IBM as having up to four times the internal operating speed of the 360/50. The 165 is said to operate up to five times faster internally than the 360/65.

### Cost Increases

The cost increases to the user to achieve these increases in performance are described by IBM as relatively modest.

Faster core memory is partly the reason for the increased performance of the 370s. Main memory of the 155 has a 2.1-μsec cycle time, while the 165 has a cycle time of 2.0 μsec.

The incorporation of buffer storage between main memory and the central processor in both systems accounts for the greater part of the performance increment.

These buffers, using monolithic circuitry (Monolithic Systems Technology or MST, according to IBM), are said to reduce significantly the effective main storage cycle and match closely the memory cycle to CPU cycle by allowing the CPU to get data directly from the buffer.

The Model 155 buffer has a 115-nsec cycle time while the buffer cycle in the 165 has an 80-nsec time. The buffer memory, similar to those in the 360 Models 85 and 195, holds large blocks of data and instructions ready for use by the CPU.

It operates automatically, re-

(Continued on Page 4)



Linda Larrick adjusts the load unit address on the IBM 370/155 installed at IBM's field systems center in Poughkeepsie, N.Y.

## Peripherals Will Enhance Throughput

By Christine Frederickson
CW Staff Writer

NEW YORK – Throughput of the IBM 370/155 and 370/165 will be "greatly enhanced" with two new IBM peripherals: a high storage capacity, 30 msec access, disk drive and a 2,000 line/min printer.

The 3330 disk drive and the 3211 printer are compatible with some models of the IBM System 360.

Also supporting the 370 are IBM's 2880 block multiplexer and 2305 fixed head disk memory, initially announced [CW, Feb. 25] for use on the 360/85 and 195.

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## Will July 17 in New York Be a DP 'Black Friday'?

By Edward J. Bride
CW Staff Writer

NEW YORK – The superstitious may say that "three" is a lucky number, but Manhattan area DP centers have a vested interest in the non-significance of three this year.

For "three in a row" might mean three consecutive years that the peak usage of electrical power in New York occurred on July 17.

This is significant because a "blowout" would probably occur on that date. Additionally, this year July 17 falls on Friday, which is always a peak day anyway. If the peak for the summer occurs on a Friday, it will definitely drain electrical resources.

Consolidated Edison, "The" power company, noted that the peak power usage in 1968 and 1969 occurred on July 17, which were Wednesday and Thursday, respectively, but which were also the hottest days in 90-degree-plus heat waves.

The U.S. Weather Bureau in New York reported high humidity with 96-degree temperatures last year, and high humidity

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### Computer Tape Copied

## Firms Sue in Mailing List Theft

By Thomas J. Morton
CW Midwest Bureau

CHICAGO – Three former computer operators of Encyclopedia Britannica (EB) obtained and sold, without authorization, the company's confidential list of customers' names and addresses, according to a suit filed in Cook County Circuit Court here against three former employees and one corporation.

The suit, filed by EB, charged that over two million names and addresses on tape were involved. The list was allegedly obtained by the three men, CW was told, by copying the reels of tape of EB, presumably on EB equipment and on EB time. A spokesman for EB said that the three men had worked on the night shift in the computer center.

EB is asking for $1 million in exemplary damages and an additional amount in actual damages to be determined by the court. EB's suit estimates an actual loss in excess of $3 million. The men named in the suit are Lawrence L. Smith, Ross C. Andree, and Harold J. Foy.

The corporation included in the suit is Computerized Marketing, Inc., also known as H & S World Shoppers, with headquarters in Chicago. EB alleges in its suit that Smith and Andree formed the company, and, through this company, made several sales of the list for direct mail solicitation. Foy is alleged to have been associated with Smith and Andree in their company, the suit claims.

The suit states that all three men had been discharged from EB previously. Smith, according to the suit, had been employed as a computer operator from October, 1967 to December, 1968. Andree, the suit claims, had also been a computer operator from August, 1968 to December, 1969, and Foy from January, 1966 to August, 1968.

CW was unable to contact the defendants.

### Mail Service Firm

The suit further claims that Business Mailers, Inc., a Chicago direct mail service company, was retained by Computerized Marketing, Inc. as a broker to rent and to advertise for rent the lists on the reels provided by Computerized Marketing. The suit states that, in good faith, Business Mailers rented the lists to third parties, including Curtis Books, Inc., an EB competitor.

Charles Berc, president of Business Mailers, told CW that the men presented seven reels of tape to his company, approximately 800,000 names and addresses. A contract was signed with his firm, he stated, that claimed the reels and the information on them were the sole property of the concern presenting them.

"On this one," Berc said, "I broke my own rule. Normally, I get to know my clients pretty well, visit their plant, that sort of thing. I was out of the office on vacation when the account came in. When I came back, it looked good, so I didn't follow through on it. They had a catalog they said they were using their lists for and the artwork alone could have cost $10,000.

### 240,000 Names

Berc said he ran a market test on the list for his customer, and that the original volume of the list at the onset of discussions was 240,000 names and addresses. "That's normal for an operation their size," Berc explained. "When we started to work the marketing, they brought in a list of 800,000. That's when I started to smell some fish."

Berc said he and his attornies questioned the three men as to the source of their lists. When Berc attempted to verify the story given him, he said, he obtained only negative replies from the companies which were supposedly the sources of the list.

"We knew then that they didn't own the list," Berc said, "But we didn't know who did and had no real way of finding out. We killed the run right then and there of our own volition."

Three weeks later Berc found out that EB was claiming the list as its property.

EB alleges that a conspiracy began sometime in 1968, and asks for an injunction against further

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# Disk Drive, Printer Will Enhance Throughput

*(Continued from Page 1)*

The 3330 drive consists of one storage control and up to four dual disk modules. Each module contains two packs and two drives.

The average access time is 30 msec with a 200 million byte capacity for each module.

Although not compatible with the 2314, the 3330 is being offered to the user as a logical upward progression from the older disk system. The 2314, however, can be used directly with the 370/155 and 165, IBM said.

The 3330 uses new interchangeable IBM 3336 disk packs, each with a capacity of 100-million bytes. The 3336 disk pack contains 12 disks with 20 recording surfaces, 19 of which store data. The 20th is used for timing the approach of the desired record to the read/write head.

The 3330 is suited to large data base applications, IBM said. The 3330 (with eight disk drives) will rent for about $7,600/mo and sell for $357,200. Deliveries are expected to begin in August, 1971.

**High-Speed Line Printer**

The 3211 impact printer operates about twice as fast as previous IBM printers at 2,000 line/min at triple the price. It uses a 48-character train repeated in nine equal arrays. Speeds up to 2,500 line/min are possible with a 36-character train, however. The standard 132-character line can be expanded to 150 print positions.

A forms control buffer continuously controls form spacing and skipping, and permits skipping at 30 in./sec, with a maximum rate of 90 in./sec after seven lines have passed.

Other features include a powered stacker, an automatically positioned platen that adjusts itself to the thickness of the forms being used, and a tapeless carriage that eliminates carriage control tape changing between jobs.

The 3211 printer can be rented for $2,800/mo, with a purchase price of $129,150. Deliveries are scheduled for December, 1971.

**Block Multiplexer**

The 2880 block multiplexer allows the use of up to 12 channels for the System 370 Model 165 and up to six channels for the Model 155.

The multiplexer can provide a total data rate of more than eight-million byte/sec for the Model 165, and of 5.8 million byte/sec for the Model 155. Block multiplexing allows simultaneous execution of multiple high-speed channel programs. Multiple high-speed input and output devices can operate concurrently sharing a block multiplexer channel, IBM said.

Monthly rental prices for the 2880 channel range from $3,000 to $4,950; purchase prices from $141,000 to $232,650. Deliveries are scheduled the first quarter of 1971.

**Fixed-Head Memory**

The 2305 fixed-head disk memory, announced with the 2880, can operate concurrently with the 3330 by sharing a 2880 block multiplexer channel.

The 2305 is available in two models – one with a storage capacity of 5.4-million bytes, an average access time of 2.5 msec and a data transfer rate of 3-billion byte/sec for the Model 165.

The other model can operate with both Models 155 and 165, and has a storage capacity of 11.2-million bytes, average access time of 5 msec and a data rate of 1.5-million byte/sec.

Monthly rental of the 2305 facility ranges from $6,400 to $7,900, with purchase prices of $300,800, to $371,300. Deliveries are scheduled to begin in May, 1971.

| Characteristics | 2314, Model A1 | 3330 |
|---|---|---|
| Average Access Time (msec) | 60 | 30 |
| Rotational Speed (rpm) | 2,400 | 3,600 |
| Data Transfer Rate (byte/sec) | 312,000 | 806,000 |
| Storage (millions of bytes) | 29.2 to 233.4 | 200 to 800 |
| Storage Capacity | 8 packs, 10 surfaces each | 2 to 8 packs, 19 surfaces each |
| Compatibility | System 360, except Models 20, 25, 44 | System 360, Models 85 and 195 |
| | System 370 Models 155 and 165 | System 370 Models 155 and 165 |
| Price | $256,000 (8 packs and a spare) | $357,200 (8 packs) |

**Figure 1. Comparison of Disk Drives**

| Features | 1403, Model N1 | 3211 | |
|---|---|---|---|
| Speed (line/min) | 1,100 | 2,000 | 2,500 |
| Char Set | 48 | 48 | 36 |
| No. Print Positions | 132 | 132 or 150 | |
| Skipping Speed (in/sec) | 33/75 | 30 (90 after 7 lines) | |
| Form Width (in) | 3.5 to 18.8 | 3.5 to 18.8 | |
| Form Length (in) | 1 to 22 | 3 to 22.5 | |
| Rental/Mo | $875 | $2,800 | |
| Purchase Price | $39,965 | $129,150 | |

**Figure 2. Comparison of Printers**

# DP Operators Sued in Mailing List Theft

*(Continued from Page 1)*

use of the list, that Computerized Marketing and the three former employees, along with any others found to be involved, be required to return the tape and all copies and to account for all profits resulting from the use of the tape.

Sales and use of the list, according to Britannica, was discovered by the receipt of a mail piece addressed to a code name, one of EB's employees. "Decoys," said Berc of business mailers, "are one of the security measures in our business. A decoys," said Berc of Business Mailers, "are one of the security authorized use. Those guys (the three operators) might have known computers, but they sure didn't know the mail business." A spokesman at EB said its decoys were members of the marketing staff.

**'Loss of Rentals'**

In a companion suit, Business Mailers is asking $10,000 damages and $50,000 punitive damages from the same defendants for "loss of rentals and costs incurred preparing the lists."

In its suit, EB is claiming theft of property, namely the information contained on computer tape – the names and addresses of over two million of its customers. No criminal charges were placed against the three men named in its suit.

The security failure at Business Mailers would appear to be the lack of a thorough check of a customer, which Berc admitted was not his company's normal routine. "We feel," said EB's General Counsel Harold Joy, "that Business Mailers, Inc. was an innocent third party." A spokesman for Britannica would not elaborate on the EB security measures at the time of the alleged theft. He did say that "extra tight" security has been "implemented" in the EB computer operations and that the night shift will no longer operate without "total security."

Berc said: "The whole thing would never have happened (the involvement of his company) if I'd just followed my own rules and checked these people out." He added that, in his opinion, the incident wouldn't have taken place at all if Britannica had maintained a stricter security.

# A Third Consecutive July 17 in N.Y. Threatens DP With 'Black Friday'

*(Continued from Page 1)*

with 98 degrees the year before.

**'Psychological Use'**

An official of the weather bureau commented that there is also greater "psychological use" of air conditioners in the middle of July. "Whether it's hot or not," the official noted, residents "expect it to be, so they use their air conditioners."

The New York area has already experienced one brownout this year, on Friday, June 12. It was only a 3% reduction in power, so many people didn't even notice it.

But protracted heat waves or deficient equipment will reduce power reserves, making reductions of more than 3% probable.

**One Plant Down**

The nuclear power generating plant at Indian Point which was down temporarily for refueling, is now down for the summer, and Con Ed is concerned.

The plant can produce 3% of the power company's total capacity, and reserves will now be cut to 14.5%, which is below the Federal Power Commission's recommended minimum.

Con Ed estimates that the system will be out for the rest of the summer, and that three days of 90-degree temperatures would bring a "good chance" of power shortages.

# W. Germans To Get Identity Number

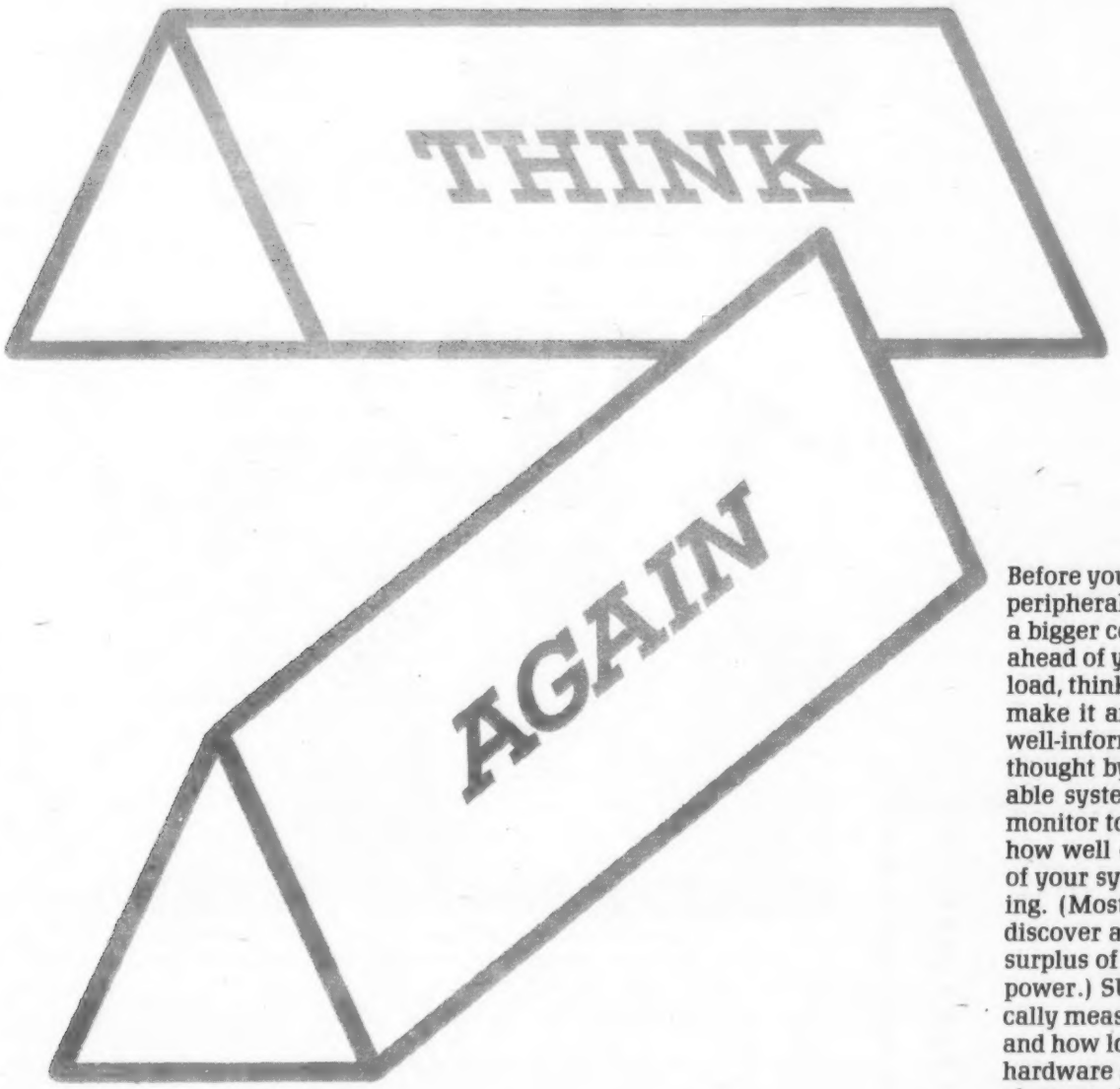
BONN, West Germany – Every West German citizen will get a 12-figure identity number by 1973, according to a draft law to be presented to the Bundestag this year.

The aim of this new registration system is to simplify and rationalize administration at all levels with the aid of computers.

Every citizen will be able to obtain copies of all data filed about him or her. These printouts will be limited to such information as may be necessary for fulfilling an official duty or a legal matter involving the citizen in question.

The first six figures of the number will show the date of birth. Chancellor Willy Brandt, who was born on Dec. 18, 1913, will get the identity number starting with 181213. This will be followed by a figure indicating sex, and another to exclude confusion with other persons born on the same day. The remainder will indicate other identification characteristics.

The figures are to be used in all areas of administration. The enumeration will be done by registration offices, but offices such as the inland revenue, income tax, road transport authorities and social insurance will also use the numbers as far as possible.




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# Medium, Large User Target of 155, 165

*(Continued from Page 1)*

quires no special programming, and is "transparent" to the user, IBM said. The net effect to the user is as if the large capacity main storage is much faster than its rated speed.

Users of the Model 165 will have a choice of five main core storage sizes, ranging from 512K to over 3-million bytes. Seven main memory sizes are available for the Model 155, ranging from 256K to over 2-million bytes.

The central processor of the System 370 operates in a native mode that uses an enhanced set of 360 instructions. The expanded set is said to help reduce execution time and instruction storage requirements. The additions enhance decimal arithmetic performance, do away with multiple move instructions and subroutines, and ease record blocking and deblocking, according to IBM.

The new hardware instructions are LOAD CONTROL, STORE CONTROL, STORE CPU ID, STORE CHANNEL ID, SHIFT AND ROUND DECIMAL, MOVE CHARACTERS LONG, COMPARE LOGICAL LONG, COMPARE LOGICAL CHARACTERS UNDER MASK, STORE CHARACTERS UNDER MASK, INSERT CHARACTERS UNDER MASK, SET CLOCK, STORE CLOCK, HALT DEVICE, and START I/O FAST RELEASE.

The savings that can be achieved by the use of the new instructions were illustrated by the MOVE CHARACTERS LONG instruction that can move up to 16-million characters with one instruction. The 360 move instructions are limited to 512 characters.

Extended floating point precision is an optional feature for the 155 and standard with the 165. Extended precision, IBM said, makes it possible for scientific and mathematical users to obtain numerical precision up to the equivalent of 34 decimal digits.

**Integrated Emulation**

Integrated emulation is an option that allows users to run IBM 1400 series and 7010 programs on the Model 155, and 7070/80/90 programs on the 165. Integrated emulation runs under control of OS, and consists of both software and hardware.

Emulator jobs of the same type can be processed along with the user's 370 programs operating in the multiprogramming environment. Emulation on the 360 requires a dedicated processor, and no multiprogramming can be performed while an emulation is under way.

In addition, the Model 155 offers an OS/DOS emulator that enables DOS programs to operate concurrently with OS jobs.

Standard on the 370 systems is CPU Retry, called by IBM a key system "availability" characteristic. It allows the computer to continue processing despite intermittent errors.

A CPU operation will be retried automatically up to seven times before a detected error is considered uncorrectable. Corrected errors, rather than interrupting operations, are logged automatically for later diagnosis during scheduled maintenance periods. There are also built-in channel retry capabilities.

Both System 370 models are provided with error correction code circuits. They automatically correct all single-bit errors and detect all double-bit and most multiple-bit errors using a procedure similar to that used for error detection and correction on phase-encoded magnetic tape.

Up to 12 data channels, providing a total data rate of more than 8-million byte/sec, can be fitted to the 165. The 155 can accommodate up to six channels with an aggregate data rate of 5.8-million byte/sec. Both models can use block multiplexing channels that allow up to 64 peripherals to be attached.

The consoles for System 370 are designed to increase operator efficiency, IBM said. The 155 offers a choice between a 15 char/sec and an 85 char/sec, printer/keyboard console. The 15/char/sec printer uses a Selectric-based device while the 85 char/sec unit uses a wire-matrix (5 by 7) printer. An additional 15 char/sec printer may be installed in a remote area of the installation, such as the tape library.

The 165 console includes a CRT display that allows the operator to track system output visually. There is also an alphanumeric keyboard for input and inquiries and a microfiche maintenance display that permits service personnel to compare internal operations of the system with documented specifications.

Two timing devices are included in the 370. An interval timer having a resolution of 3.3 msec is used to log short duration task executions and a one μsec clock provides the time of day.

In addition to the built-in diagnostic and maintenance aids, IBM customer engineers servicing System 370 installations will be able to take advantage of a new service aid concept called Retain/370 (Remote Technical Assistance and Information Network).

Retain/370 allows the customer engineer at the user site to consult a system specialist about unusual problems. Using the system the specialist will be able to check out the problem by directly interrogating the system over telephone lines, as if he were present at the user site.

Virtually all of the peripheral devices currently offered with the System 360 are available for use with the System 370.

Among the units that will not be supported are:

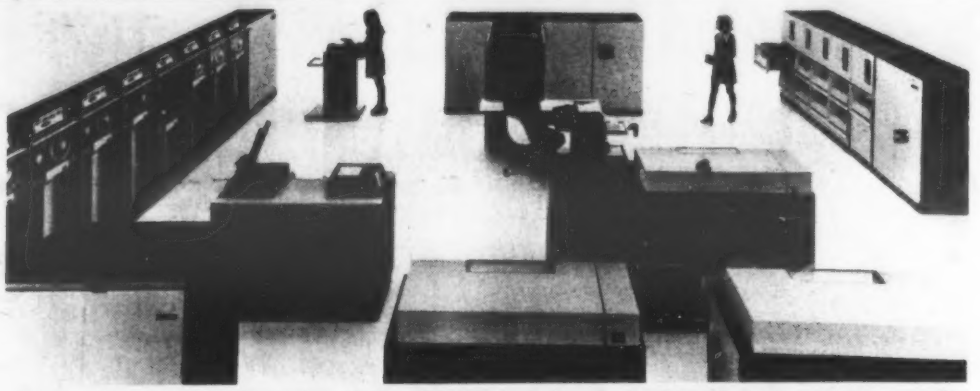
- 1259 Magnetic Character Reader.
- 1285 Optical Reader.
- 1418 Optical Character Reader.
- 1428 Alphameric Optical Reader.
- 1404 Line Printer.
- 2302 Disk Storage.
- 2361 Core Storage.

**Price Summary**

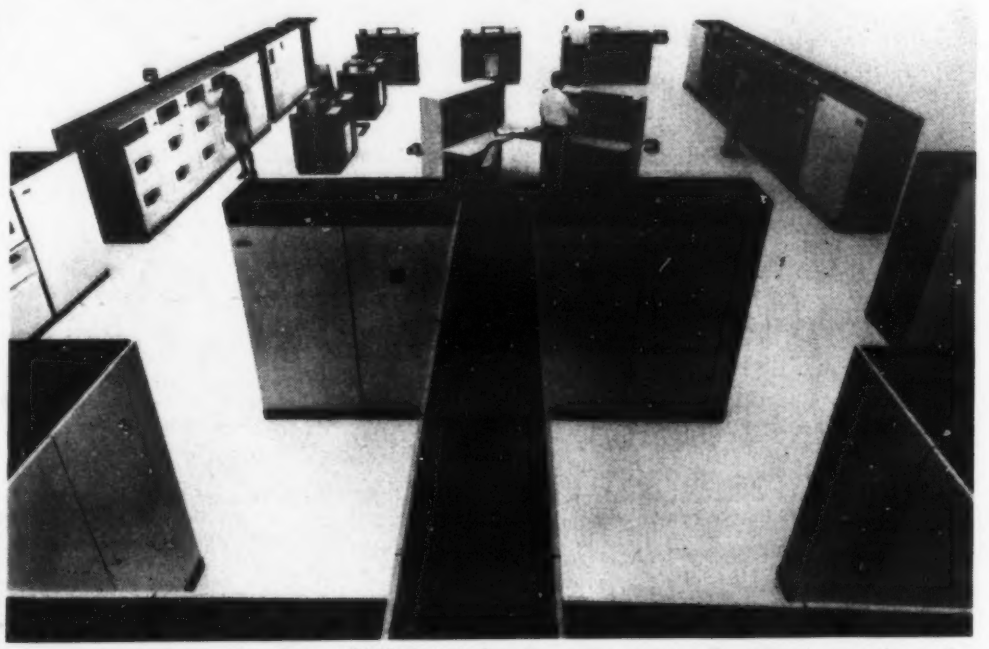
Typical System/370 Model 155 configurations will range from $37,365 monthly rental (256,000 bytes) to $78,936 (2-million bytes), with purchase prices from $1,801,110 to $3,736,080. First customer shipment will be scheduled for February, 1971.

Typical System/370 Model 165 configurations will range from $71,445 monthly rental (512,000 bytes) to $142,675 (3-million bytes), with purchase prices from $3,404,970 to $6,719,360. Initial customer delivery will be scheduled for April, 1971.

Purchase customers may use IBM maintenance service for the new system. The minimum monthly maintenance charge for a typical Model 155 configuration with 768,000 bytes of main memory will be $6,050. For a typical Model 165 configuration with 1-million bytes of main memory, the charge will be $12,450.



Engineering design configuration of the 370/155 includes: 1. keyboard/printer operator console, 2. central processing unit, 3. IBM 2314 disk drive, 4. "represents" IBM 3211 Printer.



Engineering design model of the 370/165 includes: 1. main memory, 2. central processing unit, 3. operator console, 4. microfiche maintenance display, 5. IBM 3211 printer, 6. IBM 3330 disk drive, 7. standard punched card units.

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## Users at DPMA Seminar Agree

# A Generation Does Not Consist of Hardware Alone

By Phyllis Huggins
CW West Coast Bureau

SEATTLE – Third and fourth generation equipment received heavy criticism at the recent DPMA conference, particularly in the session on "Is the Third Generation Obsolete?"

M.E. Harrell of the Diebold Group said: "Any data processing manager that goes to his management and says he should have fourth generation equipment is going to get his head chopped off."

Instead of looking forward to IBM's new computer announcement, there was little or no excitement or interest at the session as it became known that the big announcement would be made in a few days.

There was, however, nostalgic talk about 1401s and of users going back to 7090s and 7094s.

One user of 360/50s and 60s said he is on OS Version 18, and it doesn't have the fixes for Versions 16 and 17. He doesn't know whether to load all the fixes in or what to do.

"Further," he said, "IBM will only support the last two versions, so we never get one working right. This is seven years after the announcement of the 360. I'm very unhappy with IBM."

Another user, when asked if the reason for the indifference to the pending announcement was because users have become jaded to new hardware, said bluntly, "Users aren't jaded. They're numb."

### Adolescent

Session Chairman Morris B. Dorris of Univac called the third generation not only not obsolete, but still in its adolescence. Harrell added: "We've had three years of problems; now we need three years of improvements." Adrian Bos of Computer Sciences Corp. said succinctly: "We're still using second generation software so what difference does it make?"

In evaluating improvements, Bos summarized a comparison of general cost performance made in the past 10 years: CPUs have increased about 10 to 20 times, printers and card readers about two times, and tapes and disks about three times.

### Software Important

The panel agreed that faster CPUs are of little importance to the business DP user, while software, communications, and I/O control are becoming of increasing importance. "In a few years the CPU will be only 7% of the total system, and if new hardware gives you one-third saving on 7%, it doesn't mean much."

Citing improvements in existing systems, Bos said: "Exec 8 for the 1108 has, between level 18 released in 1967 and level 20 in 1970, increased in throughput four times and terminal capacity has increased eight times.

"OS/MVT for the large 360/50s and 65s in the last eight months has increased throughput capability up to three times but is still operating at 35% to 40% effectiveness as internal overhead is still over 50%.

"Further," he said, "the latest 360 releases have not yet been implemented in the field, and we still need 100% improvement in order to be worthy of being called third generation software."

One member of the audience said it takes three months to get manuals. "There has got to be a revolution so that customers can get competent help to find answers to questions as to how software will work," he said.

The general feeling of the seminar was that hardware alone does not make a generation; the concept of a generation should comprise both hardware and software.

A major reason for the difficulties that have accompanied the third generation was attributed to the more complex and flexible software that is needed to meet the user's requirements. All agreed that the existing hardware was fine – "let's put it to work" – and that new systems should make it easier for the user, not just be improved hardware.

Dorris pointed out that software follows hardware by two years, and applications follow software by two years. "Many applications being run today are too expensive for the results being obtained." Bos added that firms are slowed down because personnel is preoccupied with program maintenance necessitated by using old programs on new equipment. One member of the audience said: "We don't have time for improvements."

# 370 Gets Extended Versions of Basic 360 Software

By Don Leavitt
CW Staff Writer

WHITE PLAINS, N.Y. – The basic software of System/360, introduced in 1964, has been extended, but not redesigned, for System/370.

Reprogramming may be worthwhile, or even advisable, to take advantage of some of the hardware features available, but, for now, there have been no programming products announced that are uniquely designed for the new system. Several new or enhanced program products will be available but even these "can be used with certain 360 models," IBM admitted.

### Basic Similarity

The basic similarity of the two systems is emphasized by the fact that both 370 models are supported by OS/360 under multiprogramming with a fixed or variable number of tasks (MFT or MVT). Model 155 also has the support of DOS/360.

The evolutionary nature of the new system has been made even clearer by the IBM claim that programs written for the 360 are, in fact, object-level compatible with the 370. Not even a recompilation is said to be needed to use the old programs.

Some changes have been made, however, and an expanded instruction set, with 17 new instructions, has been included to help reduce execution time and instruction storage requirements.

IBM said the new instructions should enhance decimal arithmetic performance, do away with multiple move instructions and related subroutines, and ease the blocking and deblocking of records.

Extended floating-point precision is an optional feature for the 360/155 and standard for the 370/165. Scientific and mathematical users can obtain numerical precision up to the equivalent of 34 decimal positions with this capability, according to IBM.

A high-speed multiply feature for both fixed- and floating-point operations will be available as an option on the 370/165. IBM said a long-precision floating multiply can be completed in as little as 610 nsec; a fixed-point multiply, in 420 nsec.

### 'Integrated Emulation'

While these features may be advances over capabilities available on the 360, IBM has also shown considerable concern for users of older equipment. "Integrated emulation" is the term used for an option that allows users to run 1400 series and 7010 programs on the Model 155, and 7070/80/90 programs on the Model 165.

Although the emulators apparently have to be installed prior to delivery, emulation jobs are said to run under control of the operating system. IBM explained that emulator jobs can be processed along with the user's 370 programs operating in a multiprogramming environment. The company stressed that, with the new approach to emulation, switching from OS to stand-alone emulation is not required.

IBM said that the Model 155 also offers an OS/DOS emulator that enables DOS programs to operate concurrently with OS jobs.

The new programs and/or enhancements include a PL/1 optimizing compiler which is said to offer both DOS and OS users significant improvements in both compile and program execution speed, as well as enhancements to the existing PL/1 F-level language. The DOS version is expected to be available in July, 1971; the OS version, in September, 1971. License fee is $250/mo.

Additional language features for ANS Cobol, Version 3, running under OS, are expected in March, 1971, while the DOS version should be ready three months later. There is a $40/mo fee for OS, $75/mo for DOS.

Extensions to the Fortran H compiler and to the Fortran library will provide users with greater accuracy in solving complex mathematical problems, according to IBM. In addition, several language enhancements have also been made to improve program efficiency. These packages are expected late in the first quarter of 1971, and will carry fees of $260/mo for the compiler extensions, and $90/mo for the library changes.

While Assembler H will be updated to support the new instructions that are available with the 370, IBM made no mention of improving the speed of the processor at the same time. The company said that the instruction support will be ready in February, 1971, for $225/mo.

An OS Sort/Merge that includes support for the new IBM 3330 disk storage and Ascii files should appear shortly after the first of the year. The fee for this will be $60/mo.

Users of large-scale data bases and/or data communications will be given additional support on the System/370 with a new version of IBM's Information Management System. IMS II will be available in either a pure batch or a batch and communications version in March of next year. The batch version has a fee of $500/mo, while the combination batch/communications package has a fee of $1,060/mo.

Enhancements to the General Purpose Simulation System (GPSS) will allow OS and DOS users to construct larger mathematical simulation models than were previously possible. Both the OS and DOS versions are expected to be ready in the fourth quarter of this year. Each has a fee of $75/mo.

Two hardware features of the 370, the buffer memory and the high-speed printer, would seem, at first, so radical as to require reprogramming, but IBM said no. The buffer "operates automatically, requires no special programming and is 'transparent' to the user," the company said.

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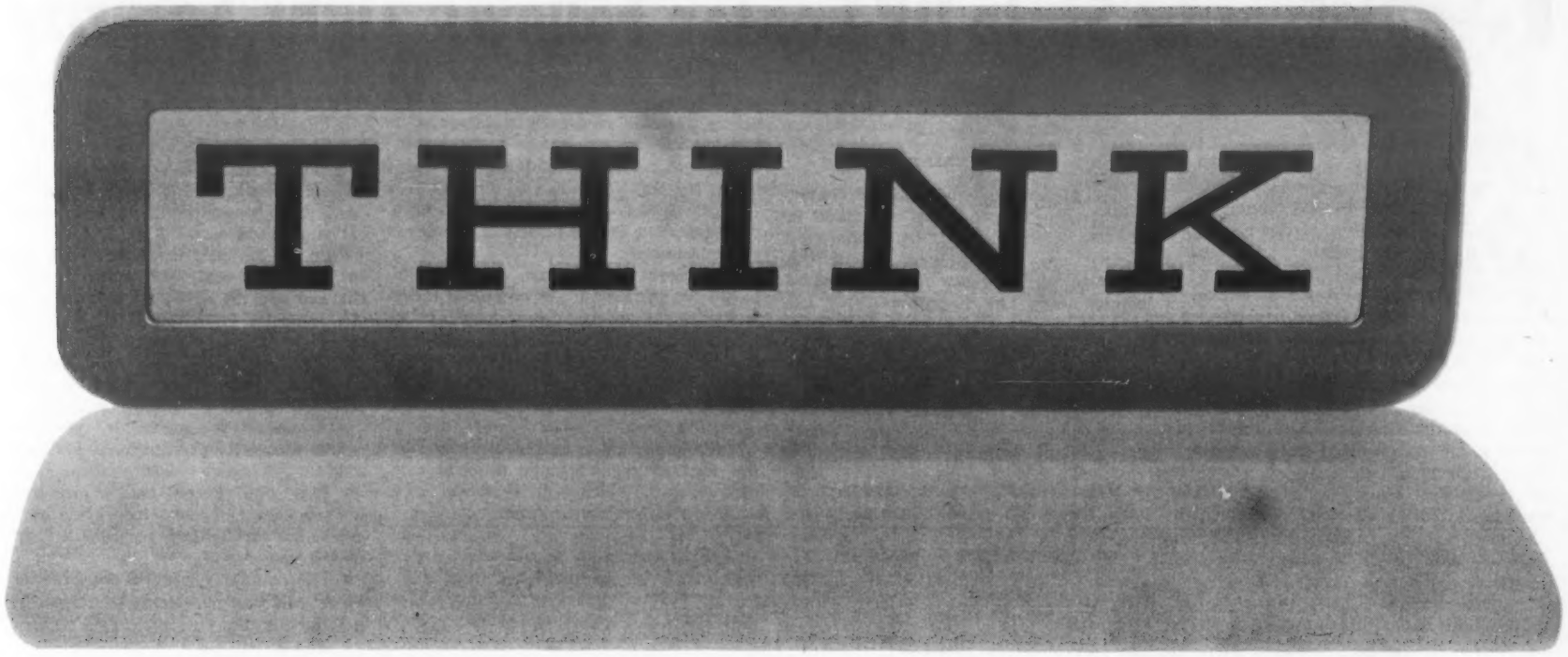
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## One Month Later

# Rebuilt Fresno State DP Center Follows Tight Security

By Phyllis Huggins
CW West Coast Bureau

FRESNO, Calif. – One month after Fresno State College's disastrous fire bombing in the computer center, the center was functioning as usual, but tighter security measures were in force.

According to W.W. Shumate, manager of ADP services, "The support of everyone was just fantastic." He particularly commended Control Data Corp. for arranging to ship a replacement system in the time it did.

The system consists of a CDC 3150 two tapes, two disks, 16K word memory, and telecommunications capability. While without its computer, Fresno programmers commuted daily to Sacramentc State College which has a comparable system. Although all tapes in the center were destroyed by the fire, they were reconstructed from back up cards and few records were lost.

### Security Changes

There are some changes in the center, however. For the low cost of $5,000 to $8,000 it was rebuilt with improved security protection. Operation of the center now follows new rules dictated by security needs. The changes are:

- Diamond mesh steel screens are being installed over all windows.
- All interior doors leading to the machine room and to the data control room, where important records are stored, will be steel-faced doors, which will open only from the inside.
- Master (panic) switches have been installed near all exits, both inside and outside the machine room doors. These switches will kill the 60-Hz and 400-Hz power, and will send a silent alarm to the fire station on campus a block away. These switches also override the air conditioner switch.
- Heat sensors and a silent alarm have been installed in the ceiling of the computer center.
- Additional $CO_2$ fire extinguishers have been installed in the computer room and adjacent areas. All exterior doors to the building in which the computer center is located will be secured at the end of the instructional day and re-entry will be restricted to authorized personnel after that time.
- All important records will be backed up with a magnetic tape duplicate (in card image), which will be stored in a vault in another building.
- All magnetic tape records and all records and programs stored on magnetic disk files will be backed up by father and grandfather files stored in a vault in another building.
- All personnel are being trained in basic firefighting techniques and in evacuation procedures.
- Locks on all the doors which give entry into the computer center are being changed and the new keys to these doors are restricted to supervisory computer center personnel.
- Entry into working areas of the computer center will be restricted to personnel actually working in that area.
- Information stored in computer center files will be available to personnel only on a "needs to know" basis.
- Exit and entry ramps are being widened and improved to provide better access for firefighting equipment if the need arises.
- The computer center is being manned by at least two persons at all times when it is operational.
- The security patrol for the area near the computer center has been increased, particularly at night.
- When there is student unrest on campus, operation of the computer center will be restricted to instructional hours. Night operations will be curtailed.


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* Statistics compiled by Computerworld's Market Research Department.

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## FTC Computers Find Consumer Problems

WASHINGTON, D.C. – The average American consumer is annoyed more by the number of merchants who do not deliver goods that are bought and paid for than by false advertising or phony finance charges, according to a computerized government survey.

The Federal Trade Commission (FTC), which has begun analyzing 80 categories of buyer complaints in the Chicago area, said that delivery failures "ran right across the face of the retail business."

"It ran from major national stores to small local stores," said John M. Lexcen, FTC counsel for federal-state cooperation. "We were suprised at the size of it."

The FTC is logging consumer gripes into a computer in an attempt to "find the injured customer right down at the buying level."

It began keeping records last fall in Chicago. By mid-March coded complaint forms were set up so that the consumer protection committee could separate consumer complaints into 80 categories, along with information on both buyers and sellers, the neighborhoods in which sales took place, and the types of sales made.

Between the end of March and the beginning of May, the Chicago office recorded over 550 complaints. About 18% of these indicated dissatisfaction with deliveries. Misleading advertisements came third behind complaints that merchandise, when it was delivered, was of inferior quality.

Other high scorers on the Chicago list included improper finance charges, failure to honor guarantees, poor servicing, debtor harassment, and hidden extra charges on purchases.

Lexcen indicated that the Chicago figures were not meaningful for the nation as a whole, "but when these figures start coming in each month from more and more cities, the FTC will be able to pinpoint problems and know which consumer groups are most severely affected.

"We'll know what principal firms and industries are generating consumer complaints, and will be able to recommend legislation accordingly," Lexcen said.

# Bell's Synthetic Voice From the Future Speaks Now

By Frank Piasta
CW Staff Writer

MURRAY HILL, N.J. – A voice from the future recites poetry and Aesop's fables at the Bell Telephone Laboratories.

Today, the voice sounds a little like a tongue-tied foreigner, but someday, perhaps in the near future, a doctor desiring the recitation of a page from a medical text, or a stock manager seeking information about company inventory may make use of the techniques being developed.

The totally synthetic voice is produced by a computer using a printed text as its only input. There is no human translation involved.

Synthetic speech has been under development for about 20 years. The current Bell Labs project started four years ago under the guidance of Dr. Cecil H. Coker, who had been working with other aspects of speech for four years previously.

Progress has been such that Coker believes the device may be ready to move from the research to the development stage possibly within six months.

Input to the speech system, which now uses Honeywell 516 with about 800K words (32-bit) of fixed-head disk storage and the time-sharing facilities of Bell Labs' GE 635, is through a Teletype.

The ordinary English text is compared against entries in the system's vocabulary, which at present consists of some 1,600 words. The computer dictionary contains the phonetic pronunciation of the word, in much the same manner that a pronouncing dictionary would. The Kenyon and Knott system of notation is used to record pronunciation.

One letter is used for the sound of most consonants, two for most vowels. Only a few special symbols can be used since the input must be Teletype-compatible. These symbols are reserved for stress marks. Numbers are used to indicate the relative length of time to be allotted each syllable during the actual speech.

### Stress Marks

Stress marks and time durations are not included in the dictionary. They are included at the time of speech generation as the context of the word determines their use. The quote mark and apostrophe are stored to indicate primary and secondary accents of each word.

Should the system encounter a word in the text that does not appear in its vocabulary, it will call for the phonetic definition of that word. When submitted, this definition will be added to the system vocabulary.

After the retrieval of all the words in a sentence, the sentence as a whole is analyzed to determine the duration of each syllable and the stress to be given to each, determined by the context of the word in the sentence and the sentence in the text.

This is done by determining the relative importance of the word and the frequency with which it had been used, for example. Frequently used verbs are not stressed as much as infrequently used ones.

A word that is placed in an unusual position in a sentence is also stressed. For example, the "in" in "The doctor is in" would be stressed more than the "in" in "The doctor is in his office."

### Information Content

Information content of a word also determines the stress given. This is determined on a scale that ranges from functional terms to intermediate level words such as polysyllabic prepositions and conjunctions to frequently used words to content words.

High content words are set apart by long consonants on their boundaries and they receive stress that elongates them more than the functional words which are shortened. In the sentence, "This is a pencil," "This is a" would take just about as long as "pencil."

Stress and duration marks are used by the synthesizer to try to emulate the human process.

After inclusion of stress and duration symbols, the phonetic version of the sentence "This is the computer" might be "DH@5IIS IIZ DHU 6KUM6PYUU-TER."

These sound parts, or phonemes, are used in a table look-up that extracts numbers defining the coordinates for the parts of the mouth – the spread of the lips; how much they are rounded (protruded); the position of the tongue tip, front and back, raised or not; the position of the tongue body; etc. These are used to model the motions of the mouth as it goes through the progress of speaking.

The factors are also used to calculate the resonances of the vocal tract, the mouth being considered an acoustic resonator. These resonances are used to control an analog computer-like device that has tunable resonances at the same frequencies as those computed for the mouth. It includes three electrically tunable resonators, each of which has a single resonant frequency and sharpness that can be set by the computer.



Cecil H. Coker, at the computer console, demonstrates a new computerized system for converting printed text into synthetic speech.

A pulse generator is used to introduce the vocal chord "buzz" typical of human speech. Also incorporated are noise generators to simulate the hisses and clicks that occur during the pronunciation of fricatives (f, v, the, th, s, z, sh, zh, h).

Final output is in the form of a voltage that is connected to either a loudspeaker or a telephone to achieve the synthetic speech.

### Success

Coker said that the success achieved by the Bell team was due to its having controls in an area where other researchers had none.

The sentences spoken by the machine are not generated in real time. Rather, they are stored on a disk used for intermediate storage until all of the component parts of the message have been translated from English. A message at a time is then read out from the disk, and the sound generated. At the present time, the message length is restricted to 16 sec.

To indicate the amount of storage required for a given text, Coker said that the *Encylopedia Britannica*, about 36 million words, could be stored in one of today's large computers.

The techniqes devised by the Bell Labs could also be applied to machines designed to speak languages other than English. Coker estimated that it would take about a year to adapt the system. They had tried during the course of a few weeks, he said, to make the device speak in Japanese, but the Japanese who heard it insisted that the resulting speech had an insufferably American accent. The fault was in the timing tables in the synthesizer, which were adjusted for English timing, he added

# FBI Files Show in Stolen Securities Rise

WASHINGTON, D.C. – The category of stolen securities is creating the fastest-growing area of concern among the 1.9 million records in the FBI's National Crime Information Center (NCIC).

Starting with 70,000 records in January, 1969, the stolen securities file has grown to almost 600,000, according to latest figures released by the FBI.

Other categories include stolen cars, license plates, wanted persons, stolen guns, boats, and other articles.

A recent NCIC newsletter encourages bankers, stockholders, and other officials handling securities to "be advised of the ready availability of the securities file."

The newsletter reports two persons recently approached an employee in a New York City bank seeking authorization to cash the U.S. savings bonds in their possession.

### Identification . . . But

They produced identification which corresponded with the names appearing on the bonds, but a bank official became suspicious and stalled the two while he telephoned the Secret Service.

After obtaining the serial numbers over the phone, the Secret Service agent made an NCIC inquiry on the securities file.

The immediate response provided information that the bonds had been stolen eight months before in a post office burglary in Trinidad, Colo.

Secret Service agents arrested the two before they could leave the bank.


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## Editorials

### Long, Hot Summer

As if users didn't have enough problems with hardware, software, peopleware, telephone lines, postal strikes, and business conditions, now the power utilities threaten to let them down.

It's enough to make them wish they had taken up some less nerve-wracking occupation, such as defusing unexploded bombs.

Small users who can't justify complete backup power supplies should contact their power utilities and try to get an honest evaluation of just how critical the local situation is.

If the power reserve is marginal, they should install instruments to record the exact time of fluctuations and to sound an alarm. If possible, they should also install at least enough backup power to allow a controlled shutdown of the system.

The alternative isn't pleasant: potential damage to the hardware and scrambled data.




*'Just Warming Up for the Summer.'*

# Letters to the Editor

### Attacks on Programmers Overlook Several Factors

Quite a bit has been written lately in most industry journals, especially CW, about the alleged inadequacy and preposterousness of programmers and systems analysts. One cannot deny that a certain amount of deadwood may have collected within a few firms. This is inevitable in the DP department as well as in most other departments (take a look at accounting, personnel, and claims departments).

Several factors have been overlooked in all of the attacks on programmers and analysts. The most important is that these much needed professional men and women are not identical to the machines they work with; they are rather people, subject to the same inadequacies and personality traits as everyone else.

Furthermore, if it should be true that they "blow up" more often than any other employee of a company, could it be the usually erratic hours they are forced to keep because of inept scheduling on the part of management?

Assuming this to be true, is it not logical to deduce that all these attacks are mere attempts of management to defend itself for ridiculous hiring practices, nonexistent policies and procedures, miserable planning, and general lack of understanding? It is in the nature of man to attack what he does not know or understand.

Management, others, and Dr. R.W. Hamming must be educated as to what data processors and computers are, then we can sit down and accept criticism. In the meantime, I think the programmers and analysts are doing a "helluva" good job.

Ilja Burkoff

Los Angeles.

### 'Blind Obedience' The Greatest Threat

Stan Myers' letter [CW, June 10] clearly shows that he did, in fact, not "carefully read" mine of May 6. At no time have I ever advocated "blind obedience." My only quarrel is with the destruction of private property used as a political means in a system permitting legitimate political action. Emotional reaction is not a source of guilt. The wrong is in permitting it to justify irrational and destructive behavior. Nor is sarcasm proper justification for such behavior.

Conscience must indeed be a primary guide. But it should guide one to constructive action. The seeds of constructive change are in the system and should be nurtured by constructive political action.

Indeed, "blind obedience" of the electorate is the greatest threat imaginable to self-government of any people. Every citizen deserving of the name is obligated to become informed and actively to demand representation continually from elected representatives. If citizens do not actively participate in the political process, they have no right to criticize its fruits. The same applies to EDPers politically concerned about the fruits of their labor. No amount of injury and property destruction can obviate the failure of a citizen to participate.

The Nazis were guilty of not participating when there was still time to prevent the horrors perpetrated by the Third Reich. A demand for rational and legitimate action cannot and must not be construed as insistence on blind obedience notwithstanding.

I would like to know how often Myers writes to his elected representatives and in how many political campaigns he has actively worked.

Charles H. Collins Jr.
Systems Engineer

Data Trends, Inc.
Parsippany, N.J.




### Management's Failure To Define Skills Cited

In his letter [CW, June 10] criticizing Milton Spett's articles, Morton Bluestone refers to something called the "systems profession." He then promptly derides Spett's contention that a body of transferable knowledge or techniques exists which can be applied without regard to the industry or type of business involved. Perhaps Spett did not make his point too well, but the fact remains that if this body of transferable skill doesn't exist or can't be developed, there is not and never will be a "systems profession."

This failure within our little "industry" to define properly the basic common skills for systems analysts may well be the single most serious oversight management can lay at our doorstep. The mind boggles at the problems in staff turnover, job-hopping, staff training, formal education requirements, wage and salary administration, staff evaluation, recruiting, and who knows what else, that would be eliminated if each systems manager only knew what he meant when he used the term "systems analyst."

Unfortunately, I'm afraid Spett will get little further with any standardization move. Too many of the resources of our "industry" are presently committed to making a very good living from the confusion caused by our failure to define job skills.

Earl Gates

Lafayette, Calif.

### Reader Surprised—He Programs for 65K 360/30

In the June 10 issue, page 30, there appeared an article entitled "Add-On Memory Raises 360/30 to 65K." It stated that users of the 360/30 were restricted to 32K. It comes as somewhat of a surprise to me, as I have programmed for a 360/30 65K acquired from IBM.

Fred Stiles
Programmer

Wilmington, Del.

**Because IBM ceased production of 2-μsec memories for the 360/30 more than 18 months ago, users of Model 30s with 2-μsec cycle times must now look elsewhere for add-on memory when they want to upgrade. Ed.**

### DP Accessories Firm Has New Address

We appreciate being included in your Data Processing Accessories listing in the May 27 issue.

We would like to call your attention to the fact that you have used an obsolete address. Our present address is 5301 Michigan Ave., Rosemont, Ill. 60018.

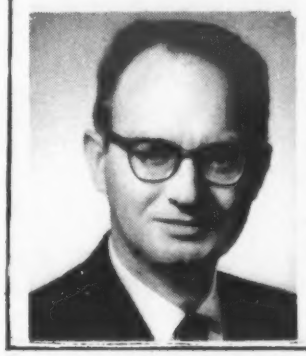
Donald W. Atcheson
Vice-President

Carroll Graphics, Inc.
Rosemont, Ill.

# OK, So What Is the True Cobol Overhead Anyway?

**The Taylor Report**

**By Alan Taylor**



Some of the comments about a recent Taylor Report [CW, May 24] have been rather delightful, both in themselves and also in the way that they illustrate the number of different considerations that are involved. Cobol has never been a simple subject – and evaluating its overhead is not going to be simple either.

Morton Bluestone, DP manager of Woodbridge Township, N.J., aimed straight at the jugular with his first sentence: "The contention, regardless of whose it is, that Cobol running times can be slashed 50% by using some other type of programming language, seems like sheer nonsense to me."

Clearly, Mr. Bluestone had interpreted my statement that we were getting the running times of Cobol programs slashed by half as equaling the statement that "Programming language X produces programs that run in half the time of the same programs when written in Cobol." That was his idea of how to reassure Cobol overhead – and it is quite an interesting idea as well.

However, I do not know of any such comparisons being undertaken as a regular routine. Personally, I like to be able to routinely compare some measurements before putting figures onto anything. That was what I did before asking whether your installations knew what your Cobol overhead was. The way I obtained my figures was by considering the comparative running times of particular Cobol programs which had been altered – but kept in Cobol – as a result of realizing the cost of various parts of the program.

So, for instance, if a program that had previously been running in two hours had a couple of paragraphs altered and then started doing the same job in one hour 12 minutes, I put the overhead involved in the orginal program as being 48 minutes, and the base time as being 120 minutes – and called it a 40% overhead.

### Method Invalid!

Now, there is no doubt in my mind that this method of estimating Cobol overhead is not rigorous – as Allan B. Ross, a programmer/analyst of Chicago pointed out. To estimate the true overhead, you would have to find out just what was the fastest possible time that the program can possibly run on the equipment concerned in any language! All I have used is the time that the program did take, which certainly can well be longer than the optimum time. But which can hardly be shorter!

So all that my method gives is a statement that the overhead is at least so-and-so. No real mathematically rigorous statement of the true overhead at all, but still I think a useable one.

There is actually another flaw in the method. It uses the wrong program time as the basis of the calculation. Having accepted the 48 minutes or whatever as being the demonstrated or minimum overhead, it then applies it to the length of time that was actually in use before the changes were made. Rigorously it should be applied to the new time – the shorter one. That is the way that overhead is applied to a department's payroll, for instance, and that can go well over 100%.

So, in the case cited, the rigorous minimum overhead should have been stated as being not less than (48/72) x 100% – i.e. 67% rather than the 40% figure I use.

### Two Defenses

I have two reasons for preferring to use my method. I find it simpler to use a figure (the old running time) that I have had around for some time, and which I understand, rather than to have to change the basis of my calculation each time a new saving is made. Using a constantly changing basis for the calculations may be all right inside a computer program, but I find it can easily fuddle my mind when I am trying to understand just what is happening.

That is a practical reason, and you can disagree with me if you want to. If you find it easy the other way, using the larger figure, then be my guest. We can always quickly work out conversion tables between the two methods, and then it is simple to talk to each other without any misunderstanding. To help out a little, I have made such a table from my end, and you can find it in the accompanying chart.

My other reason is more sentimental. A 40% overhead simply does not sound as embarrassing as a 67% overhead – and I have no wish to unnecessarily embarrass Cobol, in which I strongly believe. Of all the monuments to computer genius of the 1955 vintage, Cobol is, in my opinion, by far the greatest, and I would not let anyone decry its importance. And anyway, we do not know that there should be any embarrassment at all.

Alan Taylor, consultant, writer, and former editor of *Computerworld*, is president of Computer Management Aids Corp. of Framingham, Mass.

True, we may now be getting overhead figures for Cobol – but have you any idea as to just what the machine-code programming overhead is? You certainly could produce some sweet figures on that one if it was worth anyone's while. But it is not, so do not hold your breath waiting for them to appear. We may get PL/1's overhead, or perhaps Fortran's – but I do not see anyone spending much time getting figures for machine-code programming's overhead. There is nothing much that you can do about it even when you have them – so why worry?

### No Action Suggested

And that brings up another point, which was brought out by R.P. Beairsto, a DP manager in Owatonna, Minn. His point of departure was simply: what actions can be suggested? That is a very different story from explaining just how the overhead figure was arrived at and for people concerned with day-to-day dollar costs is perhaps more immediate and more interesting. So next week I will see what I can do to satisfy Mr. Beairsto and some other correspondents. In any case, I would like to thank all of you who took the trouble to write. It is nice knowing that there is someone out there.

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| Original Time (Minutes) | Optimized Time (% of Original) | Percentage Overhead (Taylor Method) | Percentage Overhead (Correct Method) |
|---|---|---|---|
| 100 | 100 | Nil | Nil |
| 100 | 90 | 10 | at least 11 |
| 100 | 80 | 20 | at least 25 |
| 100 | 70 | 30 | at least 42 |
| 100 | 60 | 40 | at least 67 |
| 100 | 50 | 50 | at least 100 |
| 100 | 40 | 60 | at least 150 |
| 100 | 30 | 70 | at least 233 |
| 100 | 20 | 80 | at least 400 |
| 100 | 10 | 90 | at least 900 |

**Conversion table between Taylor's method of referring to overhead and the more correct meaning and figures that others may prefer to use. This shows that a Taylor figure of 40% overhead really means that the overhead is actually unknown, but is at least 67%.**

# *Letters to the Editor*

## Most Cobol Compilers Generate Efficient Code

Alan Taylor's article "Do You Know What Your Cobol's Overhead Cost Is?" in the June 3 issue brings back memories of the past (1960-1962) when it was fashionable to agonize over the inefficiencies of Cobol. I thought that this issue had long ago been settled, but let me repeat the counter-arguments for those who have forgotten or never learned them.

First, let's look at the "small" picture – that of measuring Cobol against Assembly Language. Taylor gives several examples to demonstrate that object programs produced by Cobol compilers are 50% less efficient than machine code.

Dan McCracken answered this argument in a *Datamation* article in June, 1962. In it, he demonstrated that application of a cursory knowledge of how one's compiler treats various statements and how one's computer is organized can easily reduce run time by well over 50% (by changing a few data definitions, he reduced the run time of his example from 80 sec to 8 sec).

To this I would add that some knowledge of how to construct programs is also helpful when coding in any language. A program which contains badly structured arrays and over zealous use of subscripting can easily be changed to show a reduction of 50% run time. Courses such as Honeywell's can result in striking reductions in Cobol run times precisely because they impart knowledge of how the compiler and hardware function, and how to write better source programs.

As far as blaming the language specifications for inefficient implementations, remember that the Cobol specifications do not indicate how its features are to be implemented. Thus, a particular implementor is free to generate multiple moves or a single move to accomplish the move of a group item. He may handle the literals 1.0, 1 and 001 differently or the same (or both).

As far as the language specifications are concerned, he is free to generate as good code as his hardware permits and the marketplace demands. Every Cobol compiler does a few things inefficiently, but most of the ones I've looked at generate efficient code, if you stay away from the rough spots.

All of these arguments ignore the larger context in which high level languages should be viewed. Installations use Cobol because it is an effective way of operating. In a commercial environment where new hardware is bought every five years or sooner, deadlines are always critical and project times never long enough; programs are modified frequently, often by someone other than their author; and the average tenure of a programmer is under three years. Cobol (or Fortran or PL/1, etc.) simply gets more accomplished for less overall dollars than Assembly Language.

To summarize, it is worthwhile to point out that Cobol run times can be reduced by applying a little knowledge, but it is not worthwhile to use that fact to mount an attack on the Cobol specifications or to question whether the language is worthy of use.

Harry T. Hicks Jr.
Director, Consulting Services
Information Management Inc.
San Francisco, Calif.

## Amateurish Programmers Will Misuse a Language

Alan Taylor's report of June 3 must not go uncommented upon. Such misguided "expertise" reflects adversely on not only its author but on the publication that prints it.

I find Taylor's bandying about percentage measurements of inefficiency, and alleging that they are intrinsic to Cobol overhead, to be irresponsible. After all, if data is different, it must be converted to a common form for computations.

This is imposed by the simple fact that data is represented on cards, on tape, on disk, in memory, and on hard copy – regardless of the programming system. I wonder what Taylor thinks goes on in a formatted Read or Write statement in Fortran, or in PL/1 list-directed I/O, or in a typical Assembly Language program? Of course, we all know that what goes on here is "hidden data conversion."

Any higher level language can be misused by relatively amateurish programmers, as can an Assembly Language. To find fault with the designer of a tool rather than its uninformed or thoughtless user is stupid.

Taylor should realize that much of the benefit of Cobol or Fortran lies precisely in the fact that useful results can be obtained, even with poor programming and bad data design. This is in no way intended to encourage the continuation of such bad practice, however.

When management wakes up to the fact that qualified programming consultants are available to train personnel in good programming practices, perhaps then the systematic upgrading of its programmers can begin. Until then, it is obvious that inefficiency will persist as a real factor in the use of the computer.

Kenneth P. Seidel
Seidel Computer Associates
Northridge, Calif.

*Computerworld* welcomes comments from its readers. Preference will be given to letters of 250 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, Computerworld, 797 Washington Street, Newton, Mass. 02160.

# Illinois University Wants to Divorce Itself From Illiac

By Joseph Hanlon
CW Staff Writer

URBANA, Ill. – Student and faculty protests have apparently forced Illiac IV off the University of Illinois campus.

The $24 million Defense Department-funded supercomputer was to have been delivered Jan. 1, 1971, and housed in a new building on campus. University faculty, who had designed the computer, were to take over operation of the machine at that time.

Now, the university proposes that management and operation of the computer be taken over by someone else, and that the machine be located off campus. It would remain temporarily at Burroughs Corp.'s Paoli, Pa., plant, and the testing would begin there Jan. 1.

Under this plan, the university would be just another user, tied to the computer through the Defense Department (DoD) Advanced Research Projects Administration (Arpa) computer net.

The university's proposal follows a "Day of Illiaction," May 9, in which National Guardsmen were called to disperse over 1,000 students protesting Illiac IV. Over 100 students were arrested.

The guardsmen were already on campus as a result of demonstrations earlier in the week, protesting the killing of four students at Kent State in Ohio by that state's National Guardsmen.

The change of management should have little effect on the system. The University of Illinois staff has already written the basic compilers, operating systems, and applications software. The compilers are already running in simulation, according to David McIntyre, a senior research assistant on the project.

Through the Arpa net, the computer will be nearly as accessible as if it were on campus, McIntyre said. The university staff will be able to do necessary systems development remotely, he continued, and will cooperate with whoever takes over management of the computer.

But the change does mean that the university will be doing less advanced systems development work than originally planned, and that most of the modifications and improvements will be done by whoever takes over management.

### 10 Times Faster

Illiac IV is by far the most advanced computer to employ parallel processing. It can perform 64 similar calculations at the same time, and under certain conditions can do 200 million operations per second, 10 times more than any machine presently operating. Input, output, and compiling will be handled by a Burroughs 6500 permanently connected to the Illiac.

Wherever it is housed, Illiac IV will be tied into the Arpa computer net. By the end of the year, net members will include MIT, Harvard, Rand Corp., Stanford Research Institute, and the University of Illinois. The Arpa net is unique in that one user, say MIT, can use a program and computer at, say, Stanford, without rewriting to suite his own computer.

The primary objection on campus was that even though the University of Illinois would be operating the computer, the DoD would get two-thirds of the time. Critics charged that the DoD would use its time for studies of missile systems and for research on projects connected to the war in Vietnam.

But there will probably be little such use of this machine. The real military importance of Illiac IV is that it is a prototype for computers which have a wide range of military applications. An Arpa spokesman explained that the military (and civilian users as well) will probably purchase many Illiacs for its own use – after the design, construction, testing, and debugging have been completed.



The University of Illinois was criticized for not protecting Volo Bog, a 12,000-year-old relic of the Ice Age containing flesh-eating plants, sponge-like ground, rare Tamarack trees, and a Florida-like "Everglades" in Northern Illinois. (CW Staff Photo).

Nonmilitary uses of Illiac IV have not been determined as yet, but it is probable that Illiac designer Professor Daniel Slotnik will use it as part of his ecology study. Slotnik heads a team engaged in an eight-county study of environmental factors in Northern Illinois.

But the ecological study itself is getting the university into troubled waters. A builder, Riverwoods Development Co., planned a subdivision for land it owned next to university-owned land in Northern Lake County.

When the builder began draining operations, the draining threatened Volo Bog, a remnant of the Ice Age containing, according to Illinois conservationists and the university's ecology department, "valuable information and clues to the ecological formation of this part of the world."

The danger to the bog was stopped by a lawsuit from the Illinois Attorney General, but the university was criticized for failing to act in the defense of its own valuable ecological site.

There is a growing sentiment here among biological and ecological scientists that the land should be taken from the University of Illinois. A spokesman for the center for advanced computation would make no comment on that reaction nor on whether it would affect Slotnik's study if the land were taken away.

"Computerized decision making is necessary to avoid further ecological nightmares," Slotnik declared in testimony before a House Subcommittee on Fisheries and Wildlife Conservation, which is holding hearings on a bill to establish a national data bank on environmental factors.

Ian Marceau, professor of computer sciences, told the committee: "There is almost no way now [without computer analysis] to say whether a certain action is good or bad ecologically."

One nonmilitary program has been announced for Illiac: the U.S. Weather Bureau will be using some of the DoD's time for advanced computations on detailed studies of atmospheric conditions and on studies of long-range forecasting.

And Illiac IV's growth continues despite its growing pains. Work continues at University of Illinois and a $1 million contract has been let to Precision Instrument Corp. of Palo Alto, Calif., to supply Illiac with a one trillion-bit mass storage memory.

# Virginia Commissions Operation 'Tenpin' For Police Intercity Law Enforcement

NORFOLK, Va. – Virginia's first computer system for intercity law enforcement was commissioned here recently.

The system links Norfolk, Virginia Beach, Chesapeake, and Portsmouth in the Tidewater Electronic Network for Police Information, dubbed "Tenpin."

The network's IBM 360/40 keeps records on fugitives, habitual criminals, suspects, probation and parole cases, and stolen articles. It is also hooked into the FBI's National Crime Information Center in Washington, which keeps two million computer records of wanted persons and stolen articles.

The computer keeps four independent Tenpin files on magnetic disks with storage capacity of 233 million characters.

The four Tenpin files are:

- A warrant directory of 10,000 persons wanted by police, the charges against them, and personal information, such as physical descriptions, aliases, occupations, addresses, and frequent acquaintances.
- A surveillance file of 3,500 persons with a history of criminal activity, carrying concealed weapons, resisting arrest, and assaults on police officers.
- A probation and parole file of 1,400 persons, their home and business addresses, conviction and arrest records, the terms of their probation or parole, and the expiration dates.
- A list of 15,000 stolen articles valued at less than $500. The computer cross-references the list daily with reports from 32 pawn shops in the area.

Norfolk city officials state that security requirements have been implemented to assure that only the police departments have access to police information.

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# State's Retrieval System Proves Power of a Name

CW Midwest Bureau

JEFFERSON CITY, Mo. – An inquiring task force committee from the state legislature recently conducted an experiment on the efficiency of information retrieval on cars and drivers from the state's computers. The group's conclusion was that the validity of the data retrieved was often in doubt.

Claiming that the state highway patrol had complained on numerous occasions about the length of time it takes to obtain information, the task force arranged to test the DP operation with the patrol's assistance. The test was to determine what the computers would say about the 252 cards owned by the 160 members of the Missouri House.

The results, according to Rep. Joe Frappier, showed the computers were wrong 36% of the time. The DP unit correctly tabbed 163 autos, and missed on 89, giving seven representatives credit for owning automobiles they had never seen. Frappier, the legislator who prepared the test, is a systems analyst, but not for the state government.

### Must Use Official Name

James E. Schaffner, head of the department, said the test was "a fraud." Information on a particular Missouri registered vehicle can be obtained, Schaffner said, by interrogating the system with an owner's name, a license plate number, or a vehicle idenficiation number.

In the test by the legislators, Schaffner explained, the task force requested the highway patrol to obtain information on the automobiles owned by the legislators. The names used in the test were the names of the legislators as they are listed in the "official manual" of Missouri. "Well, some of those names," Schaffner said, "are familiar names or even nicknames. Those men register their automobiles in their official names."

Schaffner added that his department reran the test using the names of the legislators as they appear on registration forms, and the computers correctly placed 251 out of the 252. "I have no idea," Schaffner admitted, "how we missed that one car, and I can't find out why we missed it."

Schaffner's EDP department is part of the state's revenue department, which, according to sources in Missouri, is now under fire on an income tax issue by the Republican minority in the House. The revenue department recently filed an application for $356,000 under the Federal Highway Safety Act for funds to handle Missouri's vehicle and driver's license records. The state's Director of Traffic Safety, Robert E. Burgess, has not yet endorsed that application, and is on record as being critical of the DP unit, accusing it of sloppiness in its operation.

Schaffner admits that his department has its troubles. The DP system he uses is composed of three RCA Spectra 70/45s with video input and interrogation. He says it is "the largest sequential indexing system on motor vehicles and driver's licenses that RCA has installed anywhere."

His troubles, he says, come from a lack of qualified people to work in the unit. "We have over 500 programs working," he said, "and only nine programmers. I'd call that working with a skeleton crew."

He also cites a low budget for payroll, the fact that Missouri went from a microfilm record system to a computerized system overnight and with no part-by-part transition, and that most of his people are more "in-training" than "operational."

While critics of the DP unit blame the patronage system of hiring for all the unit's troubles, Schaffner defends it. "If I had to go through the 'system,'" he said, "I'd never get anybody worth the trouble. This way, when I find someone who can really do a job for us, I can get him."

# IRS Finds Fraud With Computers In Own Backyard

WASHINGTON, D.C. – The IRS Inspection Service, a wing of the Internal Revenue Service which keeps tabs on the honesty of the agency employees, revealed recently that it had found some "isolated incidents" involving computer fraud by some of its clerical employees.

No member of the agency's programming staff has been implicated, and an official of the inspection service said "no grand scheme" of fraud has been uncovered.

In addition, the official said he did not have a total dollar estimate of the attempted embezzlement, but the amount of money was not great.


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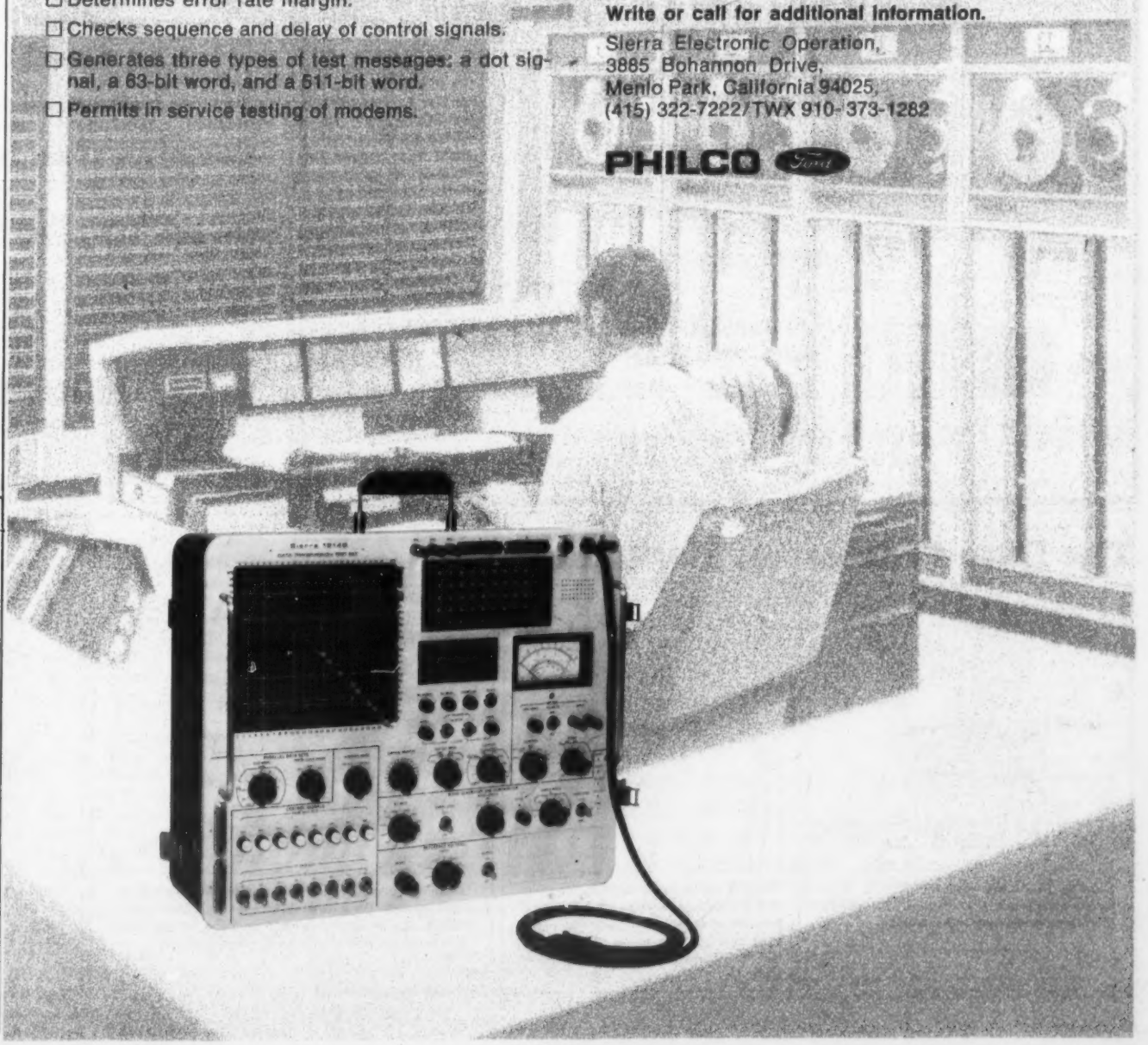
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# Programmer Must Put Himself in Place Of End-User, Says IEEE Group Official

By Edward J. Bride
CW Staff Writer

BURLINGTON, Mass. – The sophisticated programmer should stop writing for a "simple-minded version of himself" and put himself in the position of the end-user, according to an official of the Institute of Electrical and Electronic Engineers (IEEE).

Joseph G. Wohl, chairman of IEEE's Man-Machine Systems Group, said that a user sometimes has to "fight the system" to get what he wants from it, because he may not understand all the branch points in a program.

Wohl called on programmers to go to the users, put themselves literally in the position of the reservation clerk, or the clerk-typist in a production control operation.

He said the programmer must sit with the operator, and his supervisor, to identify every possible transaction that's going to occur.

"Determine the possible branch points in terms of their situation, not in terms of the programmer's," he stated.

In a recent speech to the New England chapter of the Human Factors Society, Wohl charged that designers of computer software have demonstrated little or no understanding of the fundamental principles of human factors engineering.

Programmers have ignored man-computer interaction requirements, he charged.

At his office here, where Wohl is a vice-president of Infoton, he is preparing for a September address to the "Man-Computer Interaction Conference" in England. He hopes to present some solutions to human factors-engineering problems in software.

Wohl noted that hardware manufacturers and design engineers can take courses in human engineering, capabilities, and reaction time. He said that a good systems engineer will have had courses, possibly even a minor, in the field of human factors engineering.

He pointed out that UCLA and Michigan both offer majors in the field.

"What's missing," Wohl suggested, "is that programmers come through a different route. Some business programmers don't even have a math background."

He also stated that applications programmers often do not have "any reflection or training in end-user software requirements."

Wohl noted that programmers should thoroughly understand the real "back-room situation" before starting to write the flow chart or the program.

In his speech to the Human Factors Society, Wohl predicted that over the next few years systems users would become increasingly sophisticated in their expectations.

Users will become aware that two functionally equivalent software designs can be completely different in their contribution to system effectiveness, he added.

Modern machinery involves human operators in a complex interaction with a computer, Wohl claimed, but operators continue to complain about operating difficulties directly traceable to software.

Poorly designed software, Wohl said, can nullify the potential of the operator as an adaptive element in an otherwise good computer-based system, to the detriment of the total system.

### He Gets a Reject

BUDAPEST – The computer in the Budapest marriage bureau whirred and slipped out a card to an applicant looking for a wife, but the suggestion was rejected.

He told the clerk: "This is the woman I married three years ago. We quarreled and parted."

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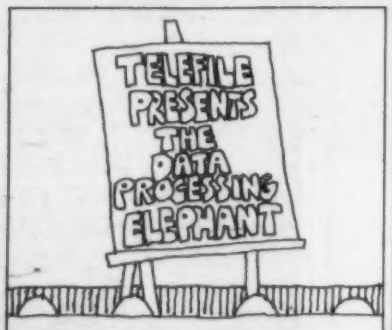
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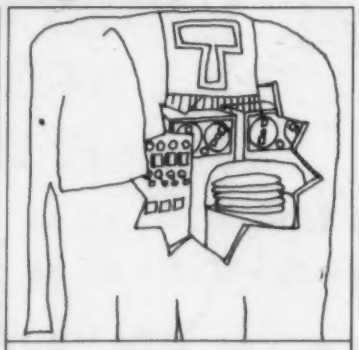
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# DOS Object Programs Can Run on OS With DUO/360

DALLAS – S/360 users are able to run DOS-written programs under OS/360 with no conversion of object programs, by enhancing their system with the DUO/360 package from Computer Technology (CT).

Previously, users facing the conversion of DOS programs to an OS environment were required to modify all of their programs to some degree. CT said that DUO/360 requires only a changeover of cards in the job stream from DOS to OS JCL format, and conversion of data sets from DOS to OS organization.

The company said that, with DUO/360, DOS programs can operate in any partition, and can use any OS feature available, plus some available only to the DOS program. The company said that DUO/360 will support "almost all" of the DOS facilities and features.

In addition to using the object decks of the DOS-written programs, the DUO/360 user can, for example, continue to use the DOS Cobol and Assembler Language processors to maintain his programs. All DOS load, fetch, and overlay facilities are provided via the DUO/360 Linkage Editor.

Because DUO/360 actually operates under OS/360, it is unable to support time-dependent operations, such as Micr or OCR reading, which are normally available under DOS. Similarly, DOS-acceptable references to specific core locations cannot be processed under DUO/360.

Functionally, DUO/360 is a set of routines, one of which must be added to the user's OS nucleus via a link-edit step. The others are selected, as needed, at execution time to process a DOS object program load module.

CT said that DUO/360 uses the direct-access space management routines of OS, and will manage and allocate direct-access space as required, and with more flexibility than is possible under DOS. This file management is transparent to the DOS user in DUO/360.

The OS facility for device allocation may be used, the company said. Any necessary device-independent functions are managed by the DUO/360 routines.

### Data Sets

Data sets can be catalogued via OS JCL in DUO/360. Under DOS, the JCL had to be changed with each run to reflect the current location of the data, CT said.

The company also said that, in DUO/360, since all JCL is that of OS, the JCL can be catalogued and later invoked from a procedure library. Additionally, the facility exists for temporarily modifying the JCL without physically changing it.

Using DUO/360, both OS and DOS may be submitted through the same job stream and, in fact, the steps can be mixed, the company said. Up to six jobs can be run concurrently, in any mix, in contrast to the maximum of three concurrent jobs that can be handled by DOS.

Since OS data management facilities are used, CT said, the writers and spooling features are automatically included in the DUO/360 capabilities.

To control the stream-of-console messages so typical of DOS, the DUO/360 package includes two special data sets. With one, messages are held from the console until a reply is needed. Then, enough messages are printed to allow the operator to understand the situation. He can then key in codes for predefined replies, from the second special data set, to cut down his effort. The replies may be captured on the console data set so that a full log can be maintained.

### OS Sort Better

The OS Sort is available to the DOS user, through DUO/360, with no change to the sort control cards. CT said that the OS Sort tends to be much better than the DOS version, especially for long or large sorts, since it tailors itself according to file size, core size, and the number of available work files.

The DUO/360 package is available at all CT computer centers, the company said, at no additional cost to clients of the centers. It is also available for lease at outside installations.

The CT computer centers have IBM 360 Models 50 to 75 available for use, with cost varying by size of the DPU partition needed, and the geographic location of the center. CT said, however, that, typically, a 360/50 with a 100K partition and "an average pattern of disk and tapes" would rent for about $200/hr of CPU time.

Monthly lease prices for use of the package in outside installations vary, depending on the size of the CPU. They range from $625/mo for a 360/40, through $950/mo for a 360/50, to $1,250/mo for a 360/65.

CT said that 25% discounts are available for multiple CPU use and multiple client use. The company provides one day of on-site installation consulting for new users.

Computer Technology Inc. is at 1507 Pacific Ave.

# CCAP/75 Gives 360 User Extended Multiprogramming

NEW YORK – A communications/multiprogramming system, CCAP/75, that can be used with existing 360 hardware, has been developed by Buttonwood Data Systems.

CCAP/75 is described as an expansion of IBM's CCAP (Communication Control Application Program). It gives the user extended multiprogramming capability while retaining all the efficiencies of CCAP as a message switching system, according to the company.

With CCAP/75, a spokesman said, it is no longer necessary to dedicate the computer to message switching alone. CCAP/75 has the ability to run up to 99 asynchronous tasks in the same computer, in batch-production and/or on-line processing, Buttonwood claimed.

Real-time applications, Buttonwood said, can now be written in Cobol, Fortran, PL/1, RPG, or ALP. They can be interfaced with the communications network by the use of simple GETQ, PUTQ, and Macros, via CCAP/75's Message Access Method (MAM).

A wide range of terminals is supported via fully integrated Btam support and CCAP/75 is said to permit full interpartition communication for complete flexibility of on-line programming.

CCAP/75 enables the user to run batch-production work in the CCAP computer without modifying the programs in any way, the company said.

Under CCAP/75, message switching is carried on as usual with no degradation of performance and with no changes to the network or the message formats. Buttonwood said that the system is enhanced by the availability of automatic and manual restart options for each partition. A task going down in one partition will not bring down the entire system. The task itself can be automatically restarted if so desired.

A further enhancement, the company said, is full storage protection up to the limit of the IBM hardware.

CCAP/75 operates under the control of CCAP and utilizes, in addition to the Sysres pack, one pack of a direct access device, either a 2311 or 2314 disk unit. The system is said to add from 9K to 20K to the current CCAP core requirements, depending on number of devices and partitions being controlled.

CCAP/75 is available with or without Btam capability. The basic system sells for $33,000. The addition of the Btam capability increases the cost to $37,000.

On a lease basis, the basic system costs $1,400/mo and the extended system costs $1,500/mo for a minimum period of one year.

Buttonwood Data Systems Inc. is at 61 Broadway.

# RCA Boosts Memory Usage With OS/70

CHERRY HILL, N.J. – Installations now using Spectra 70 DOS, TOS, or TDOS will be able to get greater communications capabilities and more efficient memory utilization by moving up to the Spectra 70 Operating System (OS/70), according to RCA.

Programs written for Spectra 70 DOS are said to be object-level compatible with OS/70. TOS and TDOS programs, however, will have to be recompiled, and their data bases converted before they can be used under the new operating system.

The languages supported by OS/70 include Cobol, Fortran, RPG, and BAL; they also provide for source level compatibility with programs originally written for the 360, RCA said.

OS/70 is described as a direct-access, disk-oriented operating system that lends itself to "highly sophisticated communications systems." It has capabilities for job scheduling, batch and remote I/O spooling and remote job entry.

### Aid for Small Systems

A Basic Communications Support package is included to aid in the development of small communications systems and in the programming of communications applications software. RCA said it includes standard line programs for RCA video display and remote batch printers/card readers.

The Communications Oriented Software (COS) system, already operational under TDOS, will also be available under OS/70, according to the company. With COS, the user has capabilities for computer-to-computer operation, on-line diagnostics, auxiliary storage control, and the simultaneous operation of six communications programs.

Outside of communications, OS/70 is said to be capable of handling up to 14 programs concurrently, in much the same way as IBM's OS/360 can handle 15 programs under MVT.

To support systems software as well as the user's problem programs, OS/70 includes dynamic memory allocation for both core and random access storage. In this way, the company said, all computer resources are kept fully employed.

Performing within either a multiprogramming or a dedicated environment, a data management system permits users to create, update, and access data bases efficiently. Integrated data base facilities are said to reduce the amount of storage required for the data, and to eliminate the need for duplication of data in order to make it available to different programs.

### Library Capabilities

RCA said that another key feature of OS/70 is the design of its library capabilities. It includes uniform blocks throughout the entire library, and a multilevel indexed structure for the table of contents. It is also open-ended to allow for the acceptance of new data classifications and access methods.

Core requirements for OS/70 will vary, depending on the capabilities selected by the user. RCA said that the operating system is modular in design. Typically, the OS/70 might take from 8K to 10K on a 65 CPU. On the 1 million byte CPU, the full OS/70 is expected to take 65K of storage.

OS/70 operates from all high-speed Spectra 70 random access devices. These include the 70/764 disk units, the 70/567 drum units, and the 70/590 direct access storage systems.

The operating system is expected to be implemented on the Spectra 70/35 and larger models. It is scheduled for first delivery in mid-1971.

# 'Cures' Monitors System Utilization

MALDEN, Mass. – Installations with no more than a 360/20 or small Univac 9000 Series CPU can monitor their own effectiveness with the Computer Utilization Reporting System (Cures), available from Computer Management Associates (CMA).

CMA said the system requires only 8K of storage and a card reader to produce three basic reports. These show system utilization by job type, by operators and programmers, and by application area or department. The system compares meter time to clock time, and shows percentages of time used.

An optional feature allows the user to allocate expenses in relation to the times used, the company said.

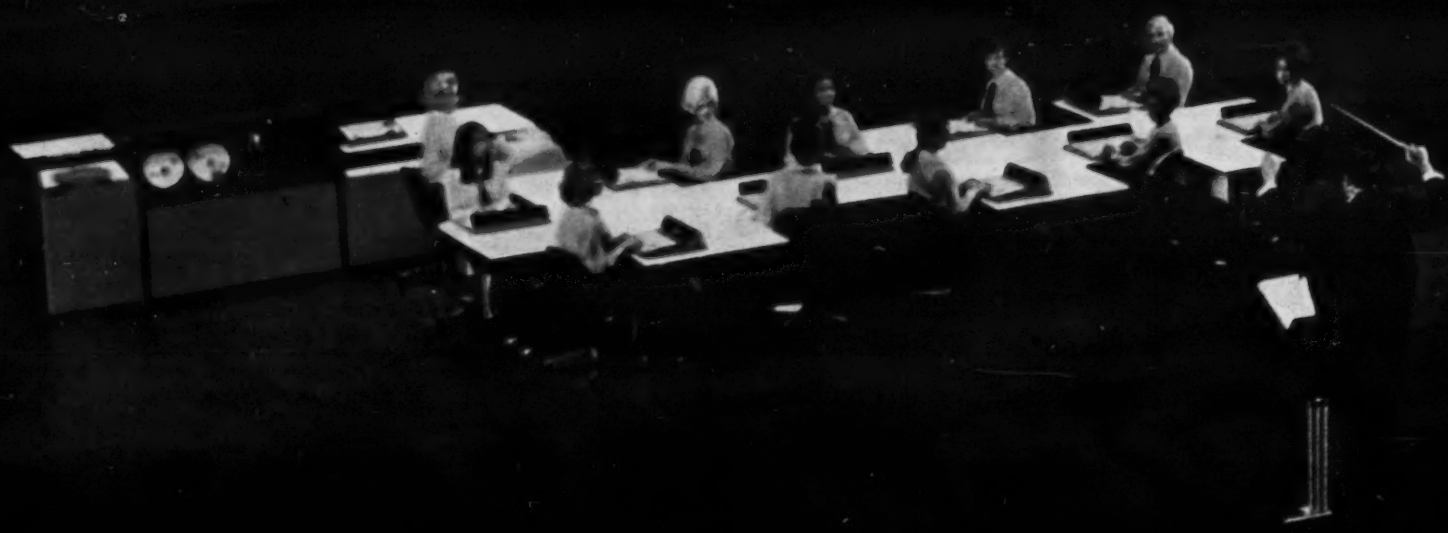
A source deck and operational manual is supplied with the system, which sells for $99.

Computer Management Associates is at 40 Summit St.

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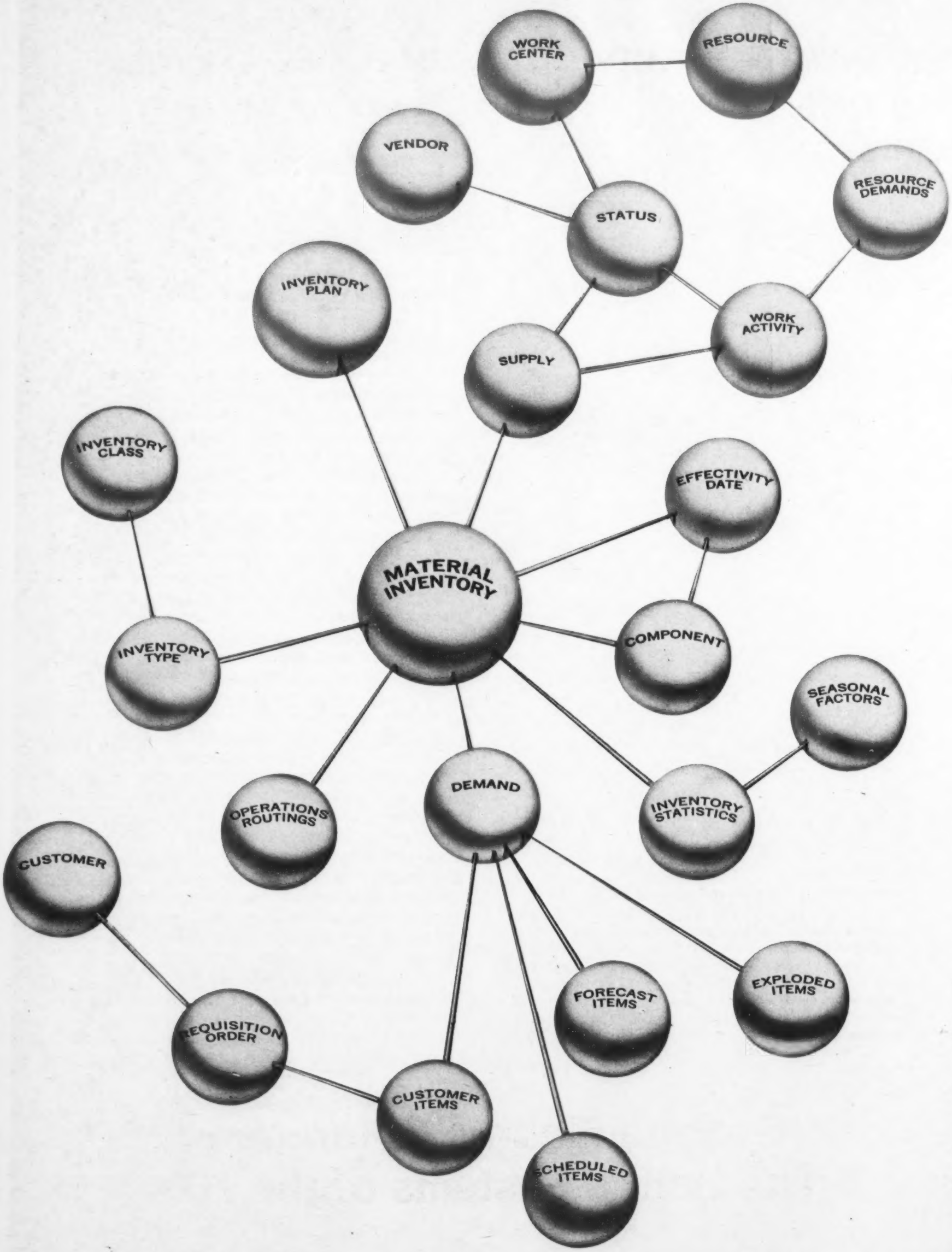
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OPERATIONS ROUTINGS
INVENTORY STATISTICS
CUSTOMER
EXPLODED ITEMS
FORECAST ITEMS
REQUISITION ORDER
CUSTOMER ITEMS
SCHEDULED ITEMS

# Compare other data base management systems with General Electric's Integrated Data Store

Use this check list to compare I-D-S with any other data base management system you know:

| | GE I-D-S | OTHER |
|---|---|---|
| Creates a variety of data structures according to user definition: | | |
| • hierarchies | ☑ | ☐ |
| • tree structures | ☑ | ☐ |
| • networks | ☑ | ☐ |
| • unlimited combinations of the above | ☑ | ☐ |
| Eliminates need for redundant data | ☑ | ☐ |
| No user intervention required in maintaining data structure linkages | ☑ | ☐ |
| Protects against the storage of duplicate data | ☑ | ☐ |
| Control key modification automatically adjusts data base relationships | ☑ | ☐ |
| Gives ten choices for the physical placement of records | ☑ | ☐ |
| Provides versatility in ordering a set of records: | | |
| • sorted | ☑ | ☐ |
| • first in, first out | ☑ | ☐ |
| • last in, first out | ☑ | ☐ |
| • random | ☑ | ☐ |
| Unlimited number of entry points into the data base | ☑ | ☐ |

| | GE I-D-S | OTHER |
|---|---|---|
| Includes all random organization methods | ☑ | ☐ |
| Dynamically allocates and deallocates data storage space | ☑ | ☐ |
| Data base can reside on a mixture of random access devices | ☑ | ☐ |
| Eliminates the need for designed overflow areas | ☑ | ☐ |
| Available data storage space is perpetually inventoried | ☑ | ☐ |
| Simple, powerful, easy-to-use language | ☑ | ☐ |
| Offers nine methods for record retrieval | ☑ | ☐ |
| Permits movement through the data base in any direction | ☑ | ☐ |
| Reduces system implementation time | ☑ | ☐ |
| Proved effective through worldwide use in a variety of businesses | ☑ | ☐ |
| Extensive error analysis is provided | ☑ | ☐ |
| Flexible debug aids | ☑ | ☐ |
| Data base accessible by COBOL or FORTRAN object programs | ☑ | ☐ |
| Supported by extensive utility routines | ☑ | ☐ |
| Continuous journalizing of data base for recovery purposes | ☑ | ☐ |
| File protection by software | ☑ | ☐ |

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GENERAL ELECTRIC

# General Electric Computers: The United Systems of the 70's

# Reverse Channel Problems Occur With AT&T's 202E9

By Ronald A. Frank
CW Technical News Editor

NEW YORK – Some users of AT&T's 202E9 data set are encountering difficulties with reverse channel operation of the unit.

The problem apparently is being caused by the susceptibility of the reverse channel to pick up unwanted signals from radio stations, RF interference, or power line interference, according to Bell sources.

The reverse channel problem first came to light earlier this year at a New Jersey site where a computer data user was utilizing the 202E9 to communicate with an 1130 system in Chicago.

The user had been operating the reverse channel without significant problems, until the data set had to be moved to a new site about a mile away. At the new location the user was unable to transmit data over the reverse channel and local phone company personnel were called in.

At that time, N.J. Bell data specialists isolated the problem as being "due to unique rock formations in the immediate area which made it impossible to obtain a good Earth ground from the local power company."

When local Bell representatives were

**Communications**

unable to rectify the problem, other AT&T data specialists including a 202E9 design engineer from Bell Labs were called in. After intensive tests in the area, a fix consisting of an isolation transformer was installed to filter out the unwanted signals being picked up by the 202E9.

After the installation of the N.J. fix, the reverse channel operated properly and one Bell source told CW "this problem was unique. It is the kind of thing that might turn up once in a thousand installations."

Since the N.J. incident, however, CW has learned of two additional 202E9 installations where reverse channel problems have occurred. In each case unwanted interference caused the inoperation and a fix had to be applied by Bell.

AT&T is now aware that the reverse channel problem could affect other 202E9 users. Last month a directive was sent from AT&T headquarters in New York to data specialists at the Bell operating companies. It informed them of the potential for trouble with the reverse channel, and instructed them to install a fix similar to the one used in N.J., when problems are found.

### 50 Users Involved

Although it is not known exactly how many users are affected by the 202E9 reverse channel problem, one Bell spokesman told CW that several hundred sets used by about 50 data users around the country are probably involved.

The 202E9 is a stripped down model of 202C and 202D data sets which cost about $40/mo. The 202E9 rents for about $14/mo, and was introduced by Bell late in 1968 for use at data installations that did not require the full capabilities offered by higher-priced units.

The 202E9 can transmit data at 1,200 bit/sec on the forward channel. The reverse channel is slower and used for checking and circuit assurance.

One user, I/O Com Inc., currently has more than 20 202E9 data sets on order. A spokesman for the firm told CW that Pacific Bell has assigned a data representative to test all future I/O Com 202E9 sites to head off any possible reverse channel problems.

### Below Capacity

The spokesman said the company uses the reverse channel to send instruction commands to remote sites from a central computer. He added that the reverse channel signals are being transmitted at less than 2 bit/sec which is well below the channel's rated capacity. He added the reverse channel problem together with slow delivery of the 202E9s was hampering I/O Com's data operations.

An AT&T official told CW that the 202E9 problem "was caused by external interference, but rather than try to eliminate the interference, we live with it and redesign the data set."

He added that the present fix being applied to 202E9s in the field is essentially a "quick fix," but more permanent versions will be included in future models of the data set manufactured by Western Electric.

He said that users having problems with reverse channel operation of the 202E9 should contract local Bell data representatives.

"The [202E9] problem should not be encountered in the future; and anywhere it exists today, it should be immediately recognized and immediately fixed," the official said.

## FCC Prepares for TWX Sale

WASHINGTON – The FCC recently instructed its staff to prepare a decision authorizing Western Union to purchase the Bell System's Teletypewriter Exchange (TWX) service.

If the purchase is completed, Western Union expects to interconnect the 42,000 TWX subscriber terminals with WU's existing Telex network.

The commission said that its decision will be released in the near future. One commissioner noted, however, that no vote on the purchase itself had been taken at the time the staff instructions were made public.

WU anticipates a total investment of about $118 million in the TWX acquisition, including about $90 million as the cost of purchasing the service from the Bell System and a number of independent telephone companies.

## Range Rider 1100 Tests 'Any' Set

PROVIDENCE, R.I. – Range Rider 1100, which reportedly provides the capability to test any data transmission system, synchronous or asynchronous, is available from International Data Sciences, Providence, R.I.

The device can be operated with simplex, half- or full-duplex systems. The 1100 generates a repeating 2047-bit random pseudo-noise sequence and permits the selectable bit-rate testing of asynchronous systems of 75 bit/sec to 9,600 bit/sec.

Other features of the instrument are an error counter, automatic receiver synchronization and resynchronization, a self-test capability and clock monitor.

The price for the complete unit is $1,900. The delivery schedule is 30 days. International Data Sciences is at 100 Nashua St.





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# System Adapter Connects Up to 15 Novas/Supernovas

SOUTHBORO, Mass. – A new interface from Data General Corp. that will connect up to 15 Novas and/or Supernovas into one multiprocessor system has a maximum data rate of 1 million byte/sec, and costs about $2,000.

The Multiprocessor Communications Adapter permits blocks of data to be transferred from one computer to another by using the data channel facilities. One adapter is attached to the I/O bus of each computer, and the adapters are interconnnected via a common communication bus.

**Independent R/T**

Each adapter includes an independent receiver and transmitter. A processor with an attached adapter may establish a logical link between its adapter transmitter and any receiver it designates.

A number of logical links concurrently share the single communications bus, using a time partitioning multiplexer built into the adapter. If there are N logical links established and communication is proceeding on all, each link receives 1/N of the communications bus time. Any of the interconnected computers may be switched off without affecting the computers still in operation.

The bandwidth of the bus is 500kHz (1 million byte/sec). This rate will only be obtained, Data General said, when a large number of links are active concurrently. Data rates are primarily determined by the processor's channel facilities. Typical data rates for a single link are:

- Nova – 100kHz (200K byte/sec)
- Supernova – 140kHz (280K byte/sec)
- Supernova with high-speed data channel option – 250kHz (500K byte/sec)

The data rate of the bus can also be adjusted by the user. The 500kHz rate is supplied as standard, but it may be reduced to 300 kHz in order to lengthen the maximum bus length to 150 feet from the standard 75 feet.

The primary application of the Multiprocessor Communication Adapter, the small computer multiprocessor system, is called by Data General a powerful, highly flexible alternative to a single large computer in many applications.

In situations characterized by relatively simple mathematical operations and substantial data communications and formatting requirements, a small computer multiprocessor system is said by the company to be less expensive and more flexible than any single medium-to-large-scale computer capable of meeting the job requirements.

**Backup Provided**

Because several compatible processors are used, the system provides its own backup in case of failure, the company said. In many cases, a multiprocessor system can also provide emergency backup for a large-scale computer in the same system, the company added.

In a typical multiprocessor system described by Data General, one small computer might handle a number of data communications lines, while another computer pre-processes data, and a third performs the actual computations.

In conjunction with a large-scale central processor, a multiprocessor system might handle all data communications and formatting functions, as well as computations up to a specified level of complexity, while very large or highly complex computations are handled by the central processor.

In this sort of hierarchical approach to data processing systems, computers of varying size and capability are matched to a variety of functions. This approach, Data General said, makes it possible to construct computer systems which match precisely the requirements of a situation and which are able to respond to changing situations dynamically.

One Multiprocessor Communications adapter is required to connect the first two minis. Each processor added to the system after that would require an additional adapter. The cost of each adpater is $2,100. Initial customer deliveries are scheduled for August 1, 1970, on a 30-day delivery schedule.

## Sycor Terminal Analysis – Part 1

# 300 Series Will Interface Easily With Large Systems

By Malcolm L. Stiefel
Special to Computerworld

Sycor, a three-year-old company, is an early bird in the key-cassette terminal business that is likely to capture more than a nominal share of worms.

It appears that the Sycor family of equipment will function very effectively as a remote batch data capture and communication system which can interface easily with the major large-scale computers.

**Basic Terminal**

The 300 Series of key-cassette terminals includes the basic terminal and a powerful group of add-ons and peripherals for different applications.

The basic terminal, whose new designation is the 340 (formerly 301), contains a keyboard, a CRT for displaying alphanumerics, one magnetic tape cassette, a microprocessor with a read-only memory, and a read/write memory.

The 340 can be bought for $6,600 or leased for $150/mo without maintenance.

The keyboard incorporates the usual arrangement of typewriter keys, a separate adding-machine-type numeric key set, and a few additional keys for entry of control information.

**Custom-Designed**

Sycor says it is willing to produce custom-designed keyboards, presumably at custom-designed prices, for customers who order "enough" terminals. More importantly, this accommodation is extended to microprocessors and communications options, which gives the user an unusual degree of flexibility in configuring equipment.

The CRT can display up to 310 characters, using a 62-character font, in 10 positions on each of 31 lines. The display is driven at 60 cycles by a delay line read/write memory, which has a 1,000 character capacity, including control characters, format (title) characters, and data.

The keyboard interfaces with the read/write memory through a data bus, which also interfaces with all other data channels in the terminal.

**Microprocessor**

The microprocessor contains a wired memory which controls the display, acceptance of input from the keyboard, and all other data transfers within the basic terminal.

It controls the position of the cursor on the CRT, and enables key verification, format control, automatic duplication, skipping, left-zero fill, and left-blank fill, with variable records up to 216 characters long.

With this basic machine, it is possible to search a cassette automatically for fields having a key-in value, to modify a field in error, or to insert characters into an existing record.

Early versions of this microprocessor didn't sense for end of record when corrections were being made, so sometimes data would be recorded in a previously established record gap, causing loss of data and much confusion on the part of the operators. This has been corrected, according to the company, in sets now coming off the production line.

The cassette recorder reads and writes at 3.9 in./sec and rewinds at 50 in./sec. Data is stored on the tape on two complementary parallel tracks, serially by bit, with 9 bits for each character, including one parity bit. Storage density is 800 bit/in., and record gaps are 1 in. long.

This amounts to a capacity of 1,000 records, each 200 characters long, which can be read or written at .83 sec/record on the 280-ft long, .15-in. wide tape. With 80 character records, the capacity is about 1700 records and the read/write speed is .49 sec/record.

The cassettes are standard units similar to the ones found in commercial stereo sets, differing only in the characteristics of the tape itself. The differences appear to be slight; A Sycor user reports that he bought some commercial cassettes when Sycor's were giving him some trouble, and "they worked just fine."

However, Sycor pointed out that the voice tapes were likely to exhibit parity errors before the Sycor tapes would. Sycor sells its tapes for $7 each, and the commercial item is available in discount stores for $1.85.

*Malcolm L. Stiefel is an independent consultant in the area of systems design. He has had extensive computer peripheral experience.*

| Features \ Model | Inforex Key Entry System | MAI 100 Data Transcriber | Sanders System 6000 | Sycor 340 Series | Viatron System 21 |
|---|---|---|---|---|---|
| CRT Display | Standard | Optional | Standard | Standard | Standard |
| Magnetic Tape | Reel | Reel | Reel | Cassette | Cassette |
| Mag Tape Compatibility with IBM Computers | Direct | Direct | Direct | Via optional converter | Via optional converter and special software |
| Communications | None | Up to 2,400 baud (optional) | None | Up to 1,200 baud (optional) | Up to 1,200 baud (optional) |
| Hard Copy | None | None | None | Optional stand-alone printer | Optional via printing robot |
| Purchase Price (Basic Terminal or Single Station, No Options) | $26,700* | $5,800 | $22,618* | $6,600 | $3,320 |

*The price per station decreases as the number of terminals increases.

Viatron's difficulties in delivery of System 21 and its switch to a purchase-only policy have prompted a search for suitable alternatives by users contemplating solutions to their source data capture and transmission problems. CW, in investigating alternatives, restricted its view to equipment that would seem to offer the users the same kind of flexibility and economy that Viatron claims.

There are relatively few candidates on the market today (see chart). Certainly there are dozens of key-to-tape systems, such as the Inforex and Sanders systems, which are designed primarily as replacements for a centralized keypunch operation.

But only a few offer the combination of source data capture and processing potential that stirred the data processing community when Viatron appeared on the scene.

The MAI and Sycor systems come close, among the companies examined, and Sycor comes closest of all. The Sycor system was chosen for a detailed study, which will appear in this series of articles.

**Correction**

In the CW June 17 issue, Ikon Data Systems Model 20 Multiplexer/Concentrator was listed as having transmission speed capability of 18.5 char/sec. It should have read 18.5K char/sec.

**360/20 FOR SALE OR LEASE**

IPS has for sale or lease and immediate delivery from its own inventory a 360/20 system. The 360/20 is a C1, 8K with 2203-A1 Printer, 2501-A1 Card Reader, and 2560-A1 MFCM. Sale Price: $62,500. Available on 2 - 5 year lease at 86% to 78% of IBM rental. IPS lease rate includes prime shift maintenance and unlimited usage. Please call or write for additional information. Also write for our Bulletins listing other computer equipment for sale or lease.

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# Ifip to Hold World Education Meeting

AMSTERDAM, Netherlands – The Ifip World Conference on Computer Education 1970 will be held Aug. 24-28 at the RAI Congress Center, Europaplein, in Amsterdam.

The conference, which will also include an exhibit on computer education, has been organized as a special activity during the Unesco International Education Year by the Technical Committee for Education and the Administrative Data Processing Group of the International Federation for Information Processing (Ifip).

The conference program will consist of special plenary sessions, supplemented by afternoon sessions during which technical papers will be presented on computer education. In addition, the conference will feature a special closing session during which reports will be given by the conference recommendations committee following which participants will vote on pertinent resolutions.

Special plenary sessions will be devoted to educational technology, fundamental aspects of computer education, and the impact of computers on society. In addition, a keynote address will be presented by Niel Ivar Bech, Copenhagen, concerning computer applications in the 70s and their consequences for education.

Additional areas to be covered during the conference include such topics as strategies for educational technology, equipment for CAI, manpower and career development, computer education in secondary schools, computer education for management, educational simulation, standards for examination, curricula for computer education, and research and testing in education technology.

COMPUTERWORLD

## societies/user groups

## Lehman to Direct Merc T/S Center

LANCASTER, Pa. – Dr. Richard S. Lehman has been named director of the Middle Atlantic Educational and Research Center (Merc), succeeding Andres Llana Jr., who resigned as operational head of the nonprofit regional time-sharing computer center here on the campus of Franklin and Marshall College.

Previously he had served as acting director of Merc from 1966 to April, 1969, during the planning stages of the multi-institution consortium.

Lehman, an associate professor of psychology at Franklin and Marshall, is a recognized authority on computer facilities for colleges and universities.

He has written many articles on the use of the computer in the social sciences and is the coauthor of *Digital Computing*, a widely used college-level text book on computer programming.

Lehman serves in the College Consulting Service sponsored by the ACM and is a member of the American Association for the Advancement of Science, the American Psychological Association, the ACM, and the Psychometric Society.

### King Wins ACM N.Y. Race

NEW YORK – ACM's New York regional representative race, voided last month because of electioneering charges leveled at one of the three candidates [CW, June 10], has been won by Kenneth M. King in a runoff election. He is currently the director of the Computer Center at Columbia University.



*Call for Papers*

1970 ACM SPECIAL INTEREST COMMITTEE ON FILE DESCRIPTION AND TRANSLATION (Sicfidet), Nov. 15-16, Rice University in Houston, Texas.

The nature of near-term and long-term problems in data description, data description languages, logical data structures to support various degrees of data independence, data representations for storage and communication, translation of access specifications at the logical level to access operations at the physical level, are the topics to be discussed at the workshop.

Papers of 6,000 words or less on these and related topics are invited. Authors should submit three copies of complete manuscripts (including all graphic materials when appropriate) no later than July 15, 1970, to: Dr. E.F. Codd, Building 50D, IBM Research Laboratory, Monterey and Cottle Roads, San Jose, Calif. 95114.

All inquiries relating to the workshop should be similarly addressed. Plans for registration will be announced later.

1970 CONFERENCE ON APPLICATIONS OF SIMULATION, Dec. 9-11, New York, N.Y.

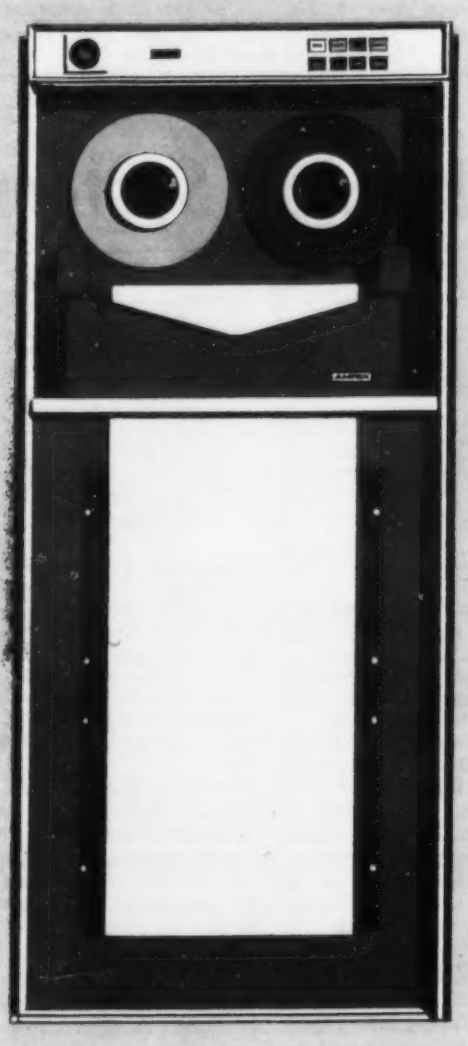
The topic of the IEEE-sponsored conference covers discrete simulation (using languages such as GPSS and Simscript, but not limited to them).

Areas of interest are statistical considerations, recent language developments, corporate and financial models, transportation and distribution models, computer systems models and languages for modeling computer systems, manufacturing applications, aerospace applications, social system models, gaming, job shop scheduling, urban system applications, and simulations of large-scale systems.

Only papers which have not been presented or published previously should be submitted. Complete papers will be published in the conference proceedings. Five draft copies including illustrations must be submitted by July 6, 1970. The final abstract is due Sept. 30.

Forward all material to Michel Araten, Program Committee Chairman, Celanese Chemical Co., 245 Park Ave., N.Y. 10017.


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AMPEX

# Computer Teams With Charlie Brown to Teach Reading

By Harvey Elman
CW Staff Writer

BILLERICA, Mass. – Snoopy, Charlie Brown, and even the Red Baron now function as teachers' aids at a local elementary school to motivate children to read using a computer.

And youngsters, even first graders, are finding them a help in learning new words and learning to read better.

Using an IBM 1130, first and second grade students at the Parker Elementary School are successfully learning the basics of reading. The computer seems to have the necessary patience for the job – something Charlie's friend Lucy often lacks.

Children taking part in the test program use the 1130 at the high school across the street, but officials are considering eventually connecting remote terminals in various elementary schools to the computer.

### Red Ink

Joseph Danahy, director of data processing for Billerica schools, explained that Parker's teachers, including his wife, select the materials – stories, questions, and vocabulary words – which are to be programmed. Many of the materials revolve around the exploits of the comic strip characters. Red ink indicates the appearance of a new word; others are printed in black.

The child uses each new word in a sentence. Then he is given a sentence with a missing word, one of the new words, which he must type in. Danahy stressed that the child learns both the meaning and the spelling of the words in this manner.

This introduction is followed by a story involving exploits of the comic strip characters using the new words. The computer checks comprehension by asking multiple choice questions such as: "What is the story about?" or "What word could be used to describe Lucy's dress?" The child, sitting at the keyboard, then responds to the question by pressing the proper key – a, b, c, or d.

**Education**

In cases where the computer asks for a word or complete sentence as an answer, the child types the letters on the keyboard that form the answer. Whenever a child makes a mistake, the 1130 prints out a few words of encouragement like: "No, Bobby. The answer is not c. Please try again." The encouragement given is unlimited – something a teacher cannot always do.

### Two Hours Weekly

The computer is used to supplement regular textbook instruction, not as a total reading program in itself. Presently 75 six- and seven-year-olds receive two hours of instruction per week. Because of their short attention spans, the actual time at the computer is limited to one-half hour in the morning and another in the afternoon, twice a week.

In a group of 15 randomly selected students, two students are assigned to the computer, one to work and one to observe, and then they switch places. Six students are positioned at the three keypunch stations to punch out answers, also in rotation. The remaining seven students work with the teacher at a table nearby discussing reading materials and programs. All students are rotated throughout the two-hour process.

Performing the mechanics of responding to the computer has not been a problem, despite the youthful age of the participants. Said Danahy: "We begin teaching DP at the first-grade level because we feel they're ready for it."

Teachers claim the children have shown remarkable enthusiasm for the program, and feel very "grown up" being a part of it. Some students have become so sophisticated in their reading skills that they have been able to write their own stories and questions, or beginnings and endings to others, to be programmed into the computer.

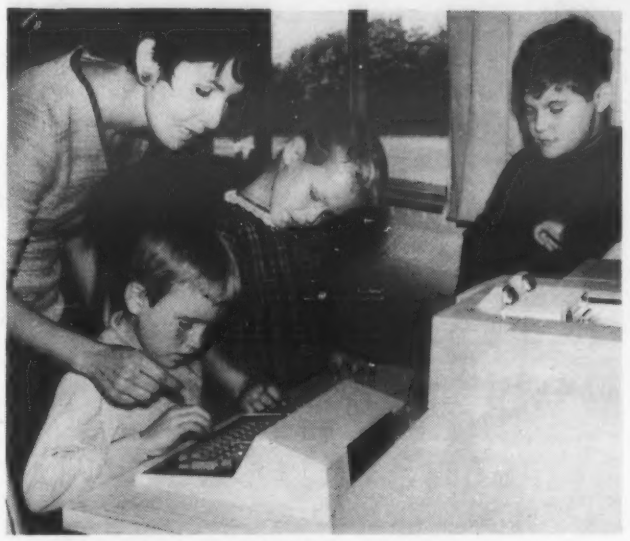
### Creativity Added

Utilizing the vocabulary words encountered in the tales of Charlie Brown and his friends has added a dimension of creativity not usually associated with a computer program, replacing the traditional "see Jane run" type of exercise.

The computer not only actually teaches, but scores all student responses as well. Three copies are issued for evaluation: one for the teacher, one for the data center, and one for the student himself. All interested parties are thus kept up to date on progress and growth.

The school has just begun utilizing the computer to teach reading skills. While this operation is considered successful in its current form, much room for expansion is still evident.

To make optimum use of the computer and have it pay for itself, the Billerica district is using it in a variety of other ways, such as student scheduling, record keeping, and payroll. But perhaps its unique feature is its primary reading program. And if the children are learning, the computer is worth its price. Even "Good Old Charlie Brown" would agree.



Michael Ross receives help from teacher Mrs. Joseph Danahy while responding to a question from the 1130 based on the exploits of comic strip characters.


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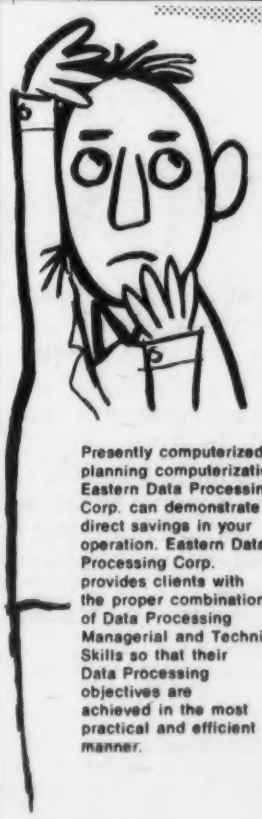
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# UCC Forms Unit to Coordinate Government Marketing

DALLAS – University Computing Co. has formed a Government Systems Division whose primary responsibility will be the coordination of marketing efforts for all UCC services and products to federal, state and local governmental agencies. It will also provide high-level management and consulting services to develop and operate major government computing installations.

The new division, headquartered in the Washington, D.C. area, will be directed by John A. Kopas, vice-president. Prior to joining UCC, Kopas had been associated with RCA computer operations for almost 10 years.

UCC offers a widely diversified line of computer services and products through a national/international network of facilities. The Government Systems Division will coordinate all marketing activities aimed at government users out of these facilities by regular UCC sales personnel and will undertake as well direct marketing activities with its own representatives for federal and other major governmental users.

UCC offers both scientific/engineering and commercial data processing services through its computer utility network and data link computer centers. The company also provides consulting and system and software development services through its applied sciences group, and R & D Division, and facility and system maintenance through its Systems Support Division.

**Bundled Package**

In making these products and services available to governmental users, the GSD will offer both a "bundled" package in which total responsibility for a computer installation – systems development, hardware, software, maintenance and general management – is undertaken for a fixed contractual term at a fixed price, and specific "unbundled" EDP services and products in any combination desired by the user.

"With this new and highly professional group devoted solely to government activities, UCC can provide an across-the-board computer services capability including facilities management that is generally unobtainable from any other single source," said Charles J. Wyly, UCC president.

"For example, through GSD, these users can now obtain specialized consulting management skills, software development and major peripherals for in-house computer systems.

The GSD group also can handle major leasing transactions between the federal government and UCC. It is acting as an interface with the Defense Department in leasing arrangements on some $17 million worth of computing equipment used with the Autodin all-digital worldwide communications network.

# Congressional Committee Signs Contract For Preliminary Work on EDP System

By Michael H. Blake Jr.
CW Washington Bureau

WASHINGTON, D.C. – A congressional committee has awarded nine contracts totaling some $450,000 for preliminary work on an EDP system for the House of Representatives.

Congress has been talking for years about development of such an internal system to help cope with its increasingly staggering work load. The contract was signed by Rep. Samuel N. Friedel (D–Md.), chairman of the House Administration Committee, with nine firms.

Work on the contracts will be administered under the House Special Subcommittee on Electrical and Mechanical Office Equipment, chaired by Rep. Joe D. Waggonner (D–La.).

The Stanford Research Institute, the primary planning contractor, will work with the subcommittee "in development of long-range plans to create a major information and analysis capability to help the House achieve a posture which will provide more balance between the House and the information power of the Executive Branch, and also provide a means to better evaluate alternative public policies," according to the subcommittee.

The awarding of the contracts appears to be a move to shortcut a more ambitious plan for computerizing the entire Congress, including the Senate, which is part of a pending House measure, the Legislative Reorganization Act of 1970 (H.R. 17654), tentatively scheduled to be taken up on the House floor on July 13. An article of this bill would create a Joint Committee on Data Processing.

Waggonner and a number of other Congressmen reportedly are not satisfied with the plan. However, even if the House should pass the bill, the Senate still must pass its version, and the two must be reconciled and sent to the President for signature.

Other companies involved in the project are Mitre Corp., which will monitor the progress of the program; System Development Corp., which will examine methods of improving the information handling capabilities of the House; and Computer Sciences Corp., which will work on streamlining the flow of information between Capitol Hill, the Executive Branch, and the private sector.

EDP Technology will research the Federal Grant Program Information System from the viewpoint of the Congress and the individual congressman's constituent service role in the grant process.

General Computing Corp. and Scientific Resources Corp. will work jointly to survey the House and congressional component for areas of potential applications of microfilm technology.

Intech Corp. will make a preliminary survey of orientation training program needs in computer technology as they relate to the evolving of Congressional Information and Analysis Support Service.

## *Survival of Fittest*

# Reservation Services Can Be Profitable

By Phyllis Huggins
CW West Coast Bureau

SHERMAN OAKS, Calif. – Bringing the computer into use as a public service is a growing trend. One example of this trend is reservation services.

The recent demise of CSC's Computicket, however, has raised questions about the profitability of such ventures. An additional concern is the possibility that due to the high overhead of terminals, line charges, computers and programming, only one or two companies will survive these public-oriented specialties.

William Lonnergan, formerly vice-president of Federal Systems for RCA/EDP and recently appointed president of International Reservations Corp. (IRC), a Planning Research Corp. subsidiary, was asked about his company's approach to profitability.

"The property we merchandise is rooms, rented cards, flowers by wire, and we may take on gourmet foods, liquor and trailer camps. Each of these services is a minimum consumer transaction of $15. What was basically wrong with the Computicket was that they were dealing in entertainment reservations which have an average cost of something like $6. They could only charge approximately 35 cents for their service. This just doesn't amortize out. We charge $1 or $1.50 per transaction and at this rate we can cover our costs."

In business only since July, 1969, IRC now handles 3,000 hotels with about 300,000 rooms; car rentals in 1,600 locations with about 60,000 cars; and has recently launched a joint operation in the British isles with the National Coal Board. The British program already has 450 hotels with 25,000 rooms contracted for. Expansion into the European field is expected soon.

Lonnergan further explained that Computicket-type services ran into heavy competition from the well-established entertainment agency business, whereas his type of service costs less than the 10% commission usually charged by travel agencies, and is even being used by some of the agencies.

"In order to succeed in this kind of business you have to improve efficiency and perform a worthwhile function for society. For example, every night there are a large number of people in New York City trying to find a hotel room. There are also a large number of rooms lying vacant. By one phone call to us we can match them up," he said. IRC utilizes twin IBM 360/50s.

There are four companies in the business – IRC, American Express, Telemax and Reservations World. IRC expects to do $80 million to $120 million business over the next five years and to realize a profit on that volume.

In addition to reservation services, the company also provides a full range of management information to subscribers such as room inventory, monthly summary reports, and a comprehensive history of the month's reservations transactions.

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# Orders and Installations

An order for over 600 bank machines, most of which will be used to create data for computer processing, has been placed by Societe Generale with NCR. The dollar value of the bank's order is $3.9 million, the largest ever received by NCR's French organization. The Syrian Government has ordered an NCR Century 100 system to assist in annual statistics summary and biennial agricultural census. Bluffton College in Ohio has also ordered an NCR Century 100.

**Johnan Savings and Loan Corp., Tokyo. has ordered two Univac 418-III systems and associated peripheral equipment, valued at about $5 million. There are several new orders for the Univac 9000 series systems. The Middletown Area School District, Harrisburg, Pa.; Washington County, Md., Commissioners; E.G. Bowles Co., of Richmond, Va.; Bross Utilities Service Corp., Bloomfield, Conn.; Southworth Machinery Inc., Menands, N.Y.; Serling Drug Co., Oak Park, butors, Doraville, Ga.; and Balliew Distributing Service Inc., Dallas, have ordered 9200s. Continental Commercial College, Birmingham, Ala., has installed a 9200-II. Central Markets, of Schectady, N.Y., has ordered a 9300. Northwestern State College, Natchitochoches, La.; the Department of Property Valuation for the State of Arizona; Safety Federal Savings & Loan Association, Kansas City, Mo.; the International Typographical Union, Colorado Springs, Col.; and Nemethy Davis, Detroit, have ordered Univac 9400s.**

Data General Corp., Southboro, Mass., has delivered its 500th Nova system to Fairchild Australia Pty. Ltd. The Nova 500 is a rack-mountable machine with 4,000 16-bit words of core memory and a teletype.

**Multidata of Westminster, Calif., has installed its Model A system in the Center for International Studies at MIT. The Model A will be used by Admins, an on-going research project in file structure and data management. The Model A was chosen because it provides the virtual memory capacity and memory management capability needed to meet system design criteria. Multidata sold 10 of its Model A systems to Electronic Stock Evaluator Corp.**

# Contracts

A $500,000 contract for further development and enhancement of the Federal Aviation Administration's computer-oriented Automated Radar Terminal System (Arts III) has been awarded to the Univac Division of Sperry Rand Corp.

Under the contract, Univac will operate and maintain a test facility at Minneapolis-St. Paul International Airport.

**A $1,036,000 contract for a surveillance and control system to monitor traffic on three freeways in Los Angeles County has been awarded to Raytheon Co. by the Division of Highways of the State of California.**

A $1 million contract to supply a one trillion-bit computer mass memory storage unit for the University of Illinois' Illiac IV has been awarded to Precision Instrument Co.

PI has also been awarded a contract to lease to the Boeing Company's Vertol Division, a $360,000, 10 billion bit computer mass memory storage unit. Both orders are for PI's unicon, (Unidensity Coherent Light Recording) Computer laser mass memory system.

**Computing and Software, Inc. has received a contract for more than $75,000 to develop a computerized warehouse inventory control system for Mattel, Inc., a national toy manufacturer in Hawthorne, Calif.**

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# Princeton Informatrix, Inc. Names Miss Whitney V P

PRINCETON, N.J. – The board of directors of Princeton Informatrix, Inc. (Pli), Princeton, N.J., appointed Muphen R. Whitney to the position of executive vice-president. Miss Whitney will be the chief executive officer for the corporation. Her responsibilities will include long-range planning of capitalization and expansions.

Miss Whitney, who is originally from Princeton, has a degree in economics from Columbia University. Before joining Pli as manager of marketing and sales, she had a private consulting practice in computer applications analysis and marketing.

## *Executive Corner*

### Other Moves

■ Gustave J. Lorenz has been elected president, and Jerry D. Howard, elected vice-president and treasurer of United Utilities Inc., Kansas City, Mo.

■ John M. Lillie has been elected executive vice-president and chief operating officer of Arcata National Corp., Menlo Park, Calif.

■ Robert D. Lebenson has been appointed as executive vice-president of Macro Services Corp., Boston.

■ Peter J. Davis has been appointed president of DPI Systems Inc., a wholly owned subsidiary of Data Pathing, Inc.

■ Edward F. Verdesca has been named president of Action-On-Line, a Computer Dimensions, Inc. subsidiary.

# *Director Recap*

William M. Martin Jr. has been elected to the board of directors of IBM, Armonk, N.Y.

**James R. Lyne Jr. has joined the board of directors at Sterling Computer Systems, Inc., Houston.**

Charles Croker III, Robert T. Davis, and Roger Lee have been elected to the board of directors of Computing and Software, Inc., Los Angeles.

**Robert S. Sinn was named chairman of the board of Ultronic Systems Corp., Mt. Laurel, N.J.**

Leon M. Shulman, James B. Hangstefer, and Walter Aikman have been elected to the board of directors of Infoton, Inc., Burlington, Mass.

**A. Crawford Cooley has been elected to the board of directors of Mobark Instruments Corp., Sunnyvale, Calif.**

Robert E. Brooker has been elected to the board of directors of Ampex Corp., Redwood City, Calif.

**Digital Resources Corp., Houston, has appointed Thomas M. Davison as director of North American Marketing of its Digital Seismic Division, Houston, Texas. The division specializes in providing the oil industry with total geophysical data processing systems.**

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# *Allied Computer Takes Lease on New Facilities*

SANTA MONICA, Calif. – Allied Computer Technology, Inc. has taken a long-term lease on expanded corporate and manufacturing facilities at 1610 Twenty-sixth St., Santa Monica, Calif.

The company has undertaken an extensive remodeling of an existing 11,000-sq-ft, two-story structure, located adjacent to Systems Development Corp.

When completed, the building will house the corporate offices research and development for both hardware and software, and will provide the necessary facilities for the in-house manufacturing of the widely used Computer Performance Monitor and the peripheral hardware, compatible with the IBM System/3.

The company recently opened an office in White Plains, N.Y. An additional office is planned immediately for the Midwest in Chicago.

## *Expansions*

### Other Expansions

Vendere International, Torance, Calif., an international marketing and service organization for the information sciences and computer industry, has opened a marketing and support office to serve the New England area. The office is at 243 Vassar Street, Cambridge, Mass.

**Systematic Design Inc. has moved its headquarters into a new 10,000-sq-ft building at 2702 National Drive in Garland, Texas. The move was necessary because of the addition of new facilities and the rapid expansion of the services offered by the company.**

Maryland National Optimation Services, Inc. made a 5,000-sq-ft expansion to the company's Rockville headquarters. This expansion has been necessitated by the tremendous reception to the services provided by the company in the Washington, D.C./Baltimore area. These services include the reading of preprinted or typewritten data to magnetic tape suitable for use on high-speed electronic computer systems.

**World Computer Corp., Dallas, Texas, has purchased a single-story office building at 1615 Stemmons Freeway to serve as its international headquarters. The property includes a 13,000-sq-ft office building on 28,000 sq ft of land.**

United Computing Systems, Inc., Kansas City, Mo., expanded its nationwide network into the New York City and the Washington, D.C. areas. The marketing and technical support offices are at Two Penn Plaza, Suite 1500, in New York; and 207 Park Ave., Suite B6B, Falls Church, Va.

**Esso Mathematics and Systems Inc. is opening a multimillion dollar, five-story office building and adjacent computing center in Florham Park, N.J.**

**The new building will permit the company to consolidate all of its operations at one location. Previously, the company maintained separate offices in New York City and in Florham Park, N.J.**

**An affiliate of Standard Oil Co. (N.J.), Esso Mathematics & Systems Inc., is responsible for applied mathematics, operations research, management information, and accounting services for Jersey Standard. It is also responsible for coordinating computing technology for Jersey Standard's affiliates around the world.**

**The new headquarters includes a modern, new computing center designed for 24-hour around-the-clock operations.**

The transfer of all elements of the Air Force's Electronic Systems Division's Deputy for Communications Systems from the Waltham Federal Center, 424 Trapelo Road, Waltham, Mass. to building 1618 at L.G. Hanscom Field has been completed.

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# New General Automation Division To Direct Planning, Development

SANTA ANA, Calif. – General Automation, Inc. has formed a new division, Automation Development Division, which will devote its efforts exclusively to planning and developing new computers, systems, and services for the industrial automation market.

The new division brings together in one organization the planning and development responsibilities previously shared by other operating units of the company. Planning and development responsibilites have been shared by the Automation Marketing Division (AMD), the Automation Products Division (APD), and the Automation Sciences Division (ASD).

Now all equipment and program development will be the responsibility of the Automation Development Division. The new unit will be charged with determining future needs and requirements in the automation marketplace and creating the equipment and programming to meet these requirements at the optimum cost.

### Other New Subsidiaries

★ Alpex Computer Corp. approved a previously announced agreement with Pitney-Bowes-Alpex, Inc. (PBA), for the manufacture and sale of computerized point-of-sale systems.

Alpex will put into PBA its p rsonnel, manufacturing facilities, and substantially all of its rights and know-how for its sales point information computing equipment (Spice) system.

Pitney-Bowes will put in $9.5 million in cash and if requested will make available its branch sales and service facilities and its capability in manufacturing, on terms to be negotiated.


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COMPUTERWORLD
## emerging enterprises

# Computeria to Develop Services For Program Franchising, Design

BRAINTREE, Mass. – Computeria, Inc. has been organized to develop and apply services for program franchising, computer sites, and control systems design which will be marketed under the tradenames of Compugram, Compusite, and Polycomp.

The Compugram service furnishes representation, conversion, installation, promotion, and support of proprietary programs on behalf of their owners and will franchise program usage via the retail outlets of time-sharing and remote-batch service centers.

The Compusite service furnishes up to turnkey design, procurement, installation, and startup of computer sites, systems and software, and remote-access terminals for the owners of time-sharing, data processing, and process control installations.

The Polycomp service furnishes systems engineering and consultation for the design and application of process control systems involving time-sharing, supervisory, direct digital, and instrument configurations.

The firm is deploying regional applications specialists in major cities to market and support its services.

### Other New Companies

★ Capital Structures, Inc., an investment service organization, has been formed in White Plains, N.Y., to service companies seeking capital – with special emphasis on data processing companies – and private and corporate investors receptive to business opportunities.

★ B-C Computers has been formed to specialize in the sale and lease of used second and third generation computers, peripherals, and application software packages.

Headquartered at 15950 Arminta St., Van Nuys, Calif., the firm also maintains offices at Culver City, Calif. Negotiations are currently under way for an international sales office at Wiesbaden, West Germany.

COMPUTERWORLD
## EDPeople

# Milt Nelson Named Itel Group VP

NEW YORK – Milt Nelson has been appointed group vice-president, operations, for Itel Corp., Data Processing Division.

In his new assignment, Nelson will be responsible for operations, development, systems and programming, market and product planning. Nelson will have overall responsibility for the quality of service as well as new market development.

Prior to coming with Itel, Nelson had over 12 years' experience with IBM in sales, systems engineering, marketing and technical management. Nelson graduated from City University with a B.B.A. in 1953. He also attended Columbia University Law School.

# Dataram Appoints Ralph Reeb VP

PRINCETON, N.J. – Ralph A. Reeb has been named administrative vice-president for Dataram Corp., a computer-memory products company.

Reeb will act as liaison between Dataram and the financial world, and will assist Dataram's president in corporate development activities and general administrative functions.

Reeb went to Dataram directly from the Philadelphia investment securities firm of Boenning & Scattergood, Inc., where he was engaged in a combination of research and institutional and individual account activities.

Prior service was with Moore Business Forms, Inc., where he was district sales supervisor.

# C.A. Christy Named PHI President

ARLINGTON, Mass. – Dr. An Wang has announced the appointment of Dr. C.A. Christy as president of PHI Computer Services, Inc., a subsidiary of Wang Laboratories engaged in consulting, developing, and marketing computer software and systems.

Five years ago, Christy joined PHI as a programmer in the company's data center. Since then he has held positions as data center manager and vice-president of the Professional Services Division.

His list of professional accomplishments includes the design of Telebatch, a remote batch processing service offered by PHI.

Born in Los Angeles, Christy received his bachelors degree in chemistry from the University of California. In 1965 he received his doctorate in physical chemistry from MIT.


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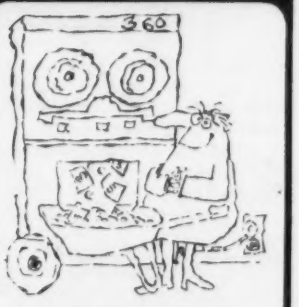
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# 370 Announcement Sheds Light on Marketing Aims

By Michael Merritt
CW Staff Writer

NEW YORK – IBM's announcement of the first two models of the System 370 opens the curtain another inch on the EDP giant's grand marketing strategy for the 1970s.

The 155 and 165 are designed to replace the middle of the 360 series, the 40, 50, 65, and 75. Renting at $48,000/mo in a typical configuration for the 155, and $98,000/mo for the 165, the new machines are more expensive; the 155 lying between the 50 and 65 in this respect, and the 165 costing a fair amount more than the 75.

This is an area where there has apparently been slippage in IBM's backlog. The 30 and 40 went into "limited production" in the summer of 1969, while the 50 and 75 also were cut back the first quarter of this year. While some of this may well be due to the existence of the 370 – companies delaying purchase orders until they see what new is coming – it appears that the limited production mainly involves refurbishing old machines with little, actual new production. Even IBM can be hurt by a recession.

But IBM apparently has several new machines in the pipeline, and the question is why did the giant decide to release two fairly large, fairly expensive machines as the first members of the 370 line.

### Several Reasons

There are several possible reasons for this.

First, IBM is acutely sensitive to the overall economic situation. At a time of high interest rates and possible liquidity problems, a small user is much less likely to want new EDP equipment than a large corporation with an established EDP equipment capital budget.

Second, replacement of 40s, 50s, 65s, and 75s by the new models will liberate the 360 models for the second-hand market. The small user will now have the opportunity to upgrade his smaller machine at a cheaper price, accepting in return something less than the latest machinery.

Third, the decision reveals that IBM is continuing to narrow its market of preference to large users with extensive DP experience and needs. One indication of this strategy was last year's unbundling, when IBM said that it considered the DP market – read IBM's DP market – sufficiently sophisticated to pick and choose the services it wanted. This was obviously opting for the GMs and the Bank of Americas.

The small or first-time user is being taken care of by the System/3, and safely tucked away in a corner to play with 96 column cards until he grows enough to be ready for the real computers, the 360/370.

### IBM and Justice

Never underestimate IBM's concern with the Justice Department. Any increase in IBM's percentage of the market will be taken only with great risk of antitrust action. But never underestimate, also, IBM's concern with increasing its profits at a rate of about 15% a year.

The solution is to get more money out of its present customer base. Unbundling, if anything, will reduce IBM's percentage of the market, but theoretically, by moving the company into paid-for services, it will increase its profits.

By the same token a new line of computers sold to old, large customers won't significantly broaden IBM's customer base, but the old reliable, affluent customers will be there to buy maybe a little more than they would have anyway. Once again the dollar volume will grow while the percentage of market penetration will remain fairly stable.

The replaced 40s, 50s, 65s, and 75s will filter down to new user levels, either at reduced rates from IBM or second-hand from, for example, leasing companies. Again, no new incursions into other manufacturers' percentage of the market, but still increased revenues from support as well as machines.

# Judge Denies Levin's Bid to Bar Seizure Of Computers by IBM; Plaintiff to Appeal

NEW YORK – Howard Levin's request for an injunction forbidding IBM to repossess computers from Levin-Townsend Computer Corp. has been denied.

Federal Judge Morris E. Lakser said that "it would be an improper exercise of the court's equitable powers to issue an injunction preventing a creditor from exercising his undisputed rights to foreclose except upon the strongest showing that the plaintiff will probably succeed in his case. Such a showing has not been made here."

Levin said he would appeal the ruling.

Levin is suing on behalf of L-T as a shareholder and director of the troubled company. L-T itself was not party to the suit.

L-T owes IBM about $15 million in back payments and interest on computers it has bought from IBM. The company's total debt to the computer maker is over $45 million.

L-T has been laggard in payments since early this year. IBM did not attempt to repossess the equipment until last month, when the third of L-T's four unsuccessful tries to find new financial backing failed. Negotiations have fallen through with Boothe Computer Corp., Randolph Computer Corp., Standard-Prudential Corp., and GAC Corp.

Levin filed an antitrust suit against IBM in April on behalf of L-T and L-T shareholders without the participation of the firm's management. The attempt to gain an injunction developed from this suit.

Levin, who was fired as head of the company he founded along with its current president, James E. Townsend, plans a proxy fight at the July annual meeting to regain control. The prospect of a proxy fight has apparently scared off potential partners for the company.

Levin's antitrust suit charges that IBM is trying to drive L-T into backruptcy because it is a competitor.

# Honeywell, GE Clarify Merger Proposal; New Firm's Center Would Be in Boston

MINNEAPOLIS – The flurry of activity in Minneapolis, Phoenix, Boston, New York, and Paris is slowly resolving some of the dimensions of the combination of Honeywell and GE computer operations.

The two companies have disclosed three more points about the merger. First, the new computer company "will be managed by Honeywell from a headquarters in the Boston area. The company will be consolidated with Honeywell's financial statement on a partial pooling-of-interest basis."

Second, the $110 million in notes Honeywell will give to GE will bear no interest the first year, and after that "interest will apply at the prevailing market rates for comparable debt."

Third, "the 1,500,000 shares of Honeywell common stock that GE will acquire will be placed in a voting trust. GE will have no representation on Honeywell's board but will nominate one director of the company." If the deal goes through, GE will be the largest single shareholder of Honeywell, owning about 9% of the outstanding common.

Honeywell and GE have signed a "memorandum of understanding" covering these points and reaffirming their interest in the merger.

A statement by GE Chairman Fred Borch and Honeywell Chairman James Binger noted that the worldwide combined value of GE and Honeywell computers on lease will be about $2 billion while the total installed value is "well over $3 billion."

The statement also said that the transaction has not yet received "necessary government approvals" from the U.S., Italy, and France. The merger will also have to be approved by Honeywell stockholders. "A proxy statement spelling out the specific details is in preparation," according to Honeywell.

The two companies have not revealed any details of the merged product line, however, nor is it certain that any final decisions have been reached in this area.

# Data General Third Quarter Results Show Rise in Sales and Earnings

SOUTHBORO, Mass. – Data General Corp. has reported increased sales and earnings for the third quarter of the current fiscal year.

Sales for the 12-week period ended June 6, 1970, were $1,894,000. Earnings for the period totaled $157,000, or eight cents per share, assuming full taxes had been payable. Including an extraordinary credit of $45,000, or two cents per share in the form of a tax credit from the remaining balance of a tax loss carried forward, earnings for the period amounted to $202,000, or 10 cents per share. The tax loss carried forward has now been fully utilized.

According to Edson D. de Castro, Data General president, third quarter results compared very favorably with the results of the first and second quarters. First quarter sales totaled $1,115,000, and earnings, assuming full taxes, amounted to $44,000 or two cents per share. Second quarter sales came to $1,413,000, and earnings totaled $108,000, or six cents per share, assuming full taxes had been payable.

Data General sales for the 36-week period ended June 6, 1970, totaled $4,422,000. Earnings for the period amounted to $309,000, or 16 cents per share, assuming full taxes had been payable. With the extraordinary credit of 10 cents per share for the tax loss carried forward, actual earnings amounted to $509,000, or 26 cents per share.

De Castro announced that Data General has entered into a $3,500,000 two-year, revolving credit agreement with the Chase Manhattan Bank, N.A., the New England Merchants National Bank, and the Worcester County National Bank. Interest will be three quarters of 1% above the prime rate.

# Recognition Equipment Posts Earnings Increase

DALLAS – Recognition Equipment Inc. has reported financial results for the first six months of fiscal 1970, ended April 30.

Net income for Recognition Equipment and its OCR subsidiaries (excluding Docutel Corp.), was $1,285,000, representing a contribution to per share earnings of 25 cents. This compares with a net loss of $354,000 for the first half of fiscal 1969, a contribution to per share loss of seven cents based on the number of shares outstanding for the first six months of fiscal 1970.

Operating revenues were $17,578,000, representing an increase of 53% over the comparable figure for fiscal 1969.

Consolidated net income, which includes 58.8% of Docutel's loss, was $795,000 or 16 cents per share. The company noted that "these earnings and revenues were achieved even though the percentage of shipments of purchased systems declined in comparison with the preceding six months. However, purchase options were exercised on previously leased equipment with a purchase value of $3.2 million."

Equipment with a purchase value of $14.7 million was delivered during the first half compared with $11.7 million during the first half of fiscal 1969. The backlog of signed contacts and letters of intent on April 30 was $21.6 million, less than the company had anticipated. As a result, shipments and net income for 1970 are expected to be less than for fiscal 1969.

About $5.5 million of equipment for wholly owned or joint-venture Corporation S Optimation Centers that was reported in the Oct. 31, 1969, backlog and planned for 1970 shipment has been removed and is not included in this backlog because Corporation S has deferred these additions to its program. The April 30 backlog includes $2.7 million of equipment for Optimation Centers. Thirty-three percent of first-half deliveries were to Optimation Centers, but they are expected to account for only a small percent of shipments during the second half.

The order rate has increased recently, and the present backlog of orders for current products is $27.7 million.

## Analysis

# Liquidity Ratio Can Be a Multifaceted Health Indicator

By Michael Merritt
CW Staff Writer

Bankruptcy in the middle of riches; that's called a liquidity crisis.

The Penn Central Transportation Co. isn't poor; rolling stock, real estate, physical plant – it has plenty of assets. Yet it is now in bankruptcy because it didn't have the cash to meet payments on its short-term debt. And it didn't have the cash because it couldn't float any more short-term loans. And it couldn't float any more loans because the assets are already extensively mortgaged.

If an asset-rich company in a stable industry, such as the Penn Central, can, through poor management, mess up its finances, the risks of monetary embarrassment are even greater for a company in an expanding industry – like EDP.

Liquidity is the common word in those depressed areas called financial circles because of fears that there simply isn't enough money to go around to meet the demand for new financing in the next few years.

A finicky stock market continues to demand growth in per share earnings, inflaming the need for new capital spending while at the same time making equity financing, which dilutes earnings per share, distasteful.

Meanwhile, corporations that expanded in the boom of the Sixties by debt financing find themselves saddled with burdensome interest costs. Analysts agree, however, that despite the high costs of loans or sale of equity, both types of new financing will rise sharply this year.

So the happiest place for a corporate treasurer to be right now is in the bank vault chuckling to himself as he riffles through a sheaf of certificates of deposit.

Not only does the treasurer of a computer company have to contend with an economic climate that's just plain rotten, he also has to satisfy management's demands for new capital to expand facilities, bring out new products, and in general keep up with the Joneses next door.

So what does he do? He doesn't want to sell more stock, nor does he find this the best of times to borrow money unless he likes paying interest of 10% to 20%.

But he has to meet the payroll, and his other interest payments, and the rent, so he carefully clamps the lid on management, stretches out orders, slows down payments on payables, and nurses his ulcer.

Meanwhile other people are trying to do the same to him, so he carefully watches his receivables and hollers for every nickle that's overdue.

A somewhat precarious position.

Unless he has a nice cushion of cash, if he misses a step on the tightrope, he'll be spending his nights reading Chapter 11.

### Selected Companies

So, who's got money? The accompanying chart shows the liquid assets – cash and marketable securities – total assets, and the ratio of the two, for 20 computer companies in four segments of the market.

The figures are from annual reports, and the companies were selected to obtain fairly recent figures; most of the figures reflect the state of the companies in the last few months of 1969, and only one is earlier than the end of September.

The percentages for the industry segments should only be taken as interesting, not rigorous. The sample is small, the figures are several months old, and the ratio of cash to total assets does not tell the whole story. Burroughs Corp., for example, has a low 3.16% ratio, but it also has a very little long-term debt; it could find new money with little trouble.

However, the tendency of the software and EDP and systems segments to carry larger cash balances does reveal something about the industries. Software houses are labor intensive; cash payrolls are significant considerations. The large manufacturers are deeply involved in leasing, and a strong cash position is necessary to bridge the gap between paying manufacturing and finally getting a check that means a profit.

To put the ratio in perspective, of *Fortune*'s top 1,000 industrial corporations, the most cash rich was Tampax, which had a 45.1% ratio, while at the other extreme several companies – a few of them healthy, surprisingly enough – had percentages less than one.

The overall average for the 20 EDP companies is 8.56%.

| Sector | Cash and Marketable Securities | Total Assets | Cash as Percentage Of Total Assets |
|---|---|---|---|
| **Systems** | | | |
| Burroughs | $35,311,338 | $1,115,515,683 | 3.16 |
| CDC | 435,607,004 | 3,954,440,354 | 11.01 |
| Data General | 96,706 | 951,870 | 10.15 |
| DEC | 1,259,000 | 61,849,000 | 2.03 |
| *IBM | 1,371,249,312 | 7,389,958,091 | 18.55 |
| | | | Average= 8.98 |
| **Software & EDP Services** | | | |
| ADR | $832,981 | $7,868,678 | 10.58 |
| Applied Logic | 2,876,162 | 14,238,372 | 20.20 |
| Computer Usage | 1,927,331 | 5,537,817 | 34.80 |
| C&S | 1,489,000 | 28,515,000 | 5.22 |
| Scientific Resources | 11,496,119 | 175,420,326 | 6.55 |
| UCC | 16,460,000 | 312,003,000 | 5.27 |
| | | | Average= 13.77 |
| **Peripherals & Subsystems** | | | |
| Bunker Ramo | $4,494,204 | $210,926,113 | 2.13 |
| EM&M | 3,601,000 | 55,233,000 | 6.51 |
| Memorex | 3,585,300 | 88,173,130 | 4.06 |
| Rec. Eq. | 7,252,802 | 192,619,639 | 7.15 |
| | | | Average= 4.96 |
| **Leasing** | | | |
| Boothe | $13,842,527 | $170,967,553 | 10.58 |
| Dearborn | 2,524,000 | 121,671,000 | 2.07 |
| Diebold | 2,761,000 | 159,327,000 | 1.73 |
| Greyhound | 13,778,559 | 192,619,639 | 7.15 |
| MAI | 3,789,701 | 153,819,244 | 2.46 |
| | | | Average= 4.79 |

*The figure given is conservative. If one includes the balance sheet entry "Treasury securities and other investments" the result is a liquid position of $1,647,731,707, for a ratio of 22.29%.

**Ratio of Liquid Assets to Total Assets**

# Canada Exchanges Gear For Mounting Workload

MONTREAL – The Montreal and Canadian Stock Exchanges soon will be using two new RCA Spectra 70 remote computing systems valued at more than $3 million to triple their capabilities for handling mounting workloads.

The new systems also will expedite the preparation of various reports released to the investing public, stock exchange members and Canada's major newspapers.

The RCA systems have been ordered by Aquila/BST Computer Services, Ltd., of Montreal, which provides computer facilities management service to the exchanges.

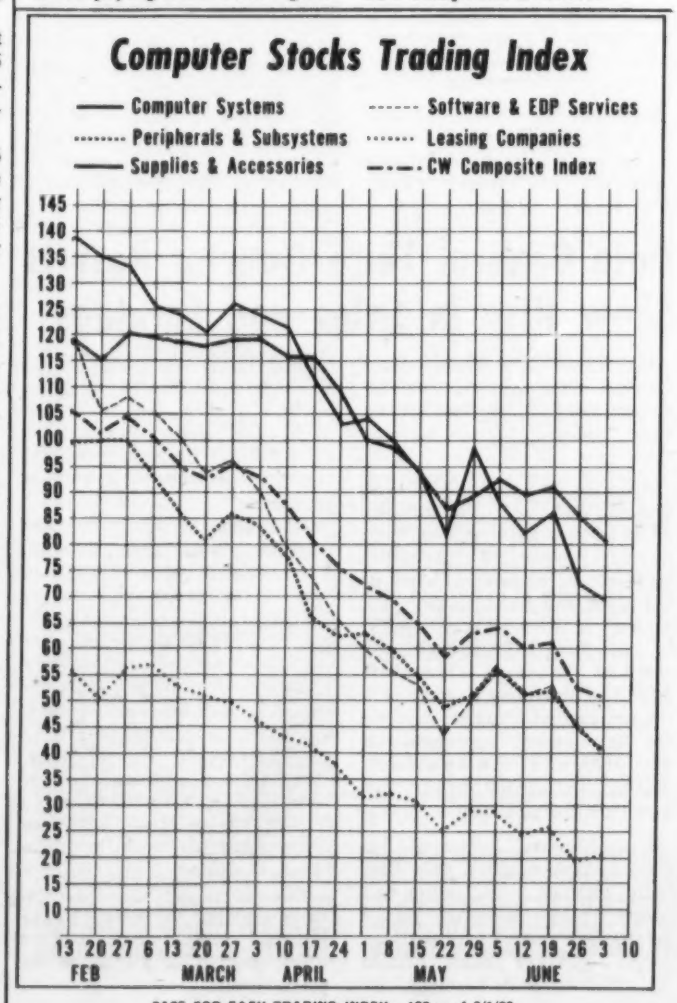
John L.H. O'Brien, president of Aquila, said a Spectra 70/45 will begin processing stock market transactions early this summer.

In November, a Spectra 70/46 time-sharing computer will be installed at the Aquila DP center to back up the Spectra 70/45 and to provide services to other Aquila customers.

According to C.B. Neapole, president of the Montreal and Canadian Stock Exchanges, the first major improvement provided by the new system will be in the stock market reports sent to Canadian newspapers. Comprehensive stock reports will be transmitted to the dailies in a form ready to be set in type.

The computers will produce six statistical reports daily in addition to a statement at the close of the market day that summarizes such information as the day's volume, high and low prices of the stocks, and their closing prices. A "box score" of the day's most active stocks, together with their highs and lows, will also be prepared.

Trading information will be entered into any of three consoles clustered on the floor and transmitted to the computer which will be programmed to detect 14 types of errors. Upon verification of an order, the computers will commit the trade to memory for later reporting and daily broker accounting usage.




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# *Computerworld* Stock Trading Summary

**NEW YORK AND AMERICAN STOCK EXCHANGE CLOSING PRICES, THURSDAY, JULY 2; OVER THE COUNTER AND NATIONAL STOCK EXCHANGE, WEDNESDAY, JULY 1**

### SUPPLIES & ACCESSORIES

| EXCH | 1970 RANGE | CLOSING PRICE | | WEEK NET CHANGE | WEEK PERCENT CHANGE |
|---|---|---|---|---|---|
| N | 15- 8 | 9 1/4 | ADAMS-MILLIS CORP | - 5/8 | - 6.33 |
| O | 21- 11 | 12 | BALTIMORE BUS FORM | - 1/4 | - 2.04 |
| A | 25- 7 | 7 | BARRY WRIGHT | - 5/8 | - 8.20 |
| A | 35- 15 | 15 1/2 | DATA DOCUMENTS | - 1/4 | - 1.59 |
| N | 19- 12 | 12 1/2 | ENNIS BUS. FORMS | - 1 | - 7.41 |
| O | 17- 8 | 9 | GRAPHIC CONTROLSCORP | - 3/4 | - 7.69 |
| N | 166- 60 | 62 3/4 | MEMOREX | - 3 3/4 | - 5.64 |
| N | 114- 73 | 73 3/4 | 3M COMPANY | - 3 3/4 | - 4.84 |
| O | 38- 29 | 29 1/2 | MOORE BUS FORMS | - 1/2 | - 1.67 |
| N | 43- 21 | 23 1/2 | NASHUA CORP. | --- | ---- |
| O | 48- 26 | 26 | REYNOLDS & REYNOLD | - 2 | - 7.14 |
| O | 30- 20 | 21 | STANDARD REGISTER | - 1/2 | - 2.33 |
| N | 39- 23 | 24 | UARCO | - 1/4 | - 1.03 |
| A | 30- 8 | 9 1/4 | WABASH MAGNETICS | - 1/4 | - 2.63 |
| O | 41- 25 | 29 1/4 | WALLACE BUS FORMS | - 1 3/4 | - 5.65 |

### COMPUTER SYSTEMS

| EXCH | 1970 RANGE | CLOSING PRICE | | WEEK NET CHANGE | WEEK PERCENT CHANGE |
|---|---|---|---|---|---|
| N | 172- 86 | 87 3/4 | BURROUGHS CORP | - 1 3/4 | - 1.96 |
| N | 37- 10 | 11 | COLLINS RADIO | - 1 7/8 | - 14.56 |
| N | 122- 33 | 33 1/8 | CONTROL DATA CORP | - 1 3/4 | - 5.02 |
| A | 124- 54 | 55 1/8 | DIGITAL EQUIPMENT | - 2 3/8 | - 4.13 |
| N | 11- 4 | 4 3/8 | ELECTRONIC ASSOC. | - 1/8 | - 2.78 |
| A | 14- 3 | 4 3/8 | ELECTRONIC ENGINEER. | - 1/2 | - 10.26 |
| N | 39- 20 | 20 | FOXBORO | - 1 | - 4.76 |
| O | 42- 9 | 9 1/2 | GENERAL AUTOMATION | - 3 3/4 | - 28.30 |
| N | 77- 60 | 68 1/2 | GENERAL ELECTRIC | + 1 1/8 | + 1.67 |
| N | 45- 20 | 20 3/4 | HEWLETT-PACKARD CO | - 2 7/8 | - 12.17 |
| N | 152- 67 | 69 1/4 | HONEYWELL INC | + 5/8 | + 0.91 |
| N | 387-237 | 250 3/4 | IBM | - 6 3/4 | - 2.62 |
| N | 86- 38 | 38 3/4 | NCR | - 5 3/4 | - 12.92 |
| N | 34- 20 | 20 | RCA | - 1/2 | - 2.44 |
| N | 33- 16 | 20 | RAYTHEON CO | - 3/4 | - 3.61 |
| O | 8- 2 | 2 1/2 | SCI. CONTROL CORP. | - 5/8 | - 20.00 |
| N | 40- 24 | 25 3/4 | SPERRY RAND | + 5/8 | + 2.49 |
| A | 49- 11 | 12 | SYSTEMS ENG. LABS | - 3 | - 20.00 |
| N | 29- 10 | 10 3/4 | VARIAN ASSOCIATES | - 1 3/4 | - 14.00 |
| A | 51- 19 | 20 5/8 | WANG LABS. | --- | ---- |
| N | 115- 70 | 72 5/8 | XEROX CORP | --- | ---- |

### LEASING COMPANIES

| EXCH | 1970 RANGE | CLOSING PRICE | | WEEK NET CHANGE | WEEK PERCENT CHANGE |
|---|---|---|---|---|---|
| O | 9- 4 | 4 5/8 | BANISTER CONTIN | + 1/8 | + 2.78 |
| O | 25- 11 | 11 | BOOTHE COMPUTER | - 1/2 | - 4.35 |
| O | 8- 3 | 4 | BRESNAHAN COMP. | - 1/2 | - 11.11 |
| O | 8- 2 | 4 3/4 | COMPUTER EXCHANGE | + 1/2 | + 11.76 |
| O | 18- 4 | --- | COMPUTER LEASING | --- | ---- |
| O | 15- 2 | --- | CYBER-TRONICS | --- | ---- |
| N | 32- 6 | 9 1/4 | DATA PROC. F & G | + 5/8 | + 7.25 |
| O | 8- 2 | 3 | DATRONIC RENTAL | - 1/4 | - 7.69 |
| A | 24- 10 | 12 1/4 | DEARBORN COMPUTER | - 1/2 | - 3.92 |
| O | 8- 3 | 3 1/8 | DIEBOLD COMP. LEAS. | - 5/8 | - 16.67 |
| A | 10- 3 | 4 | DPA. INC. | - 1/8 | - 3.03 |
| A | 22- 7 | 9 | GRANITE MGT | - 1 | - 10.00 |
| A | 44- 5 | 6 1/4 | GREYHOUND COMPUTER | --- | ---- |
| N | 30- 7 | 8 1/8 | LEASCO DATA PROC. | - 1/4 | - 2.99 |
| O | 5- 2 | 3 | LECTRO COMP LEAS | --- | ---- |
| A | 19- 3 | 6 3/8 | LEVIN-TOWNSEND CMP | --- | ---- |
| O | 3- 1 | 1 1/2 | LMC DATA, INC. | - 1/4 | - 14.29 |
| O | 4- 1 | 1 3/4 | MANAGEMENT ASSIST | - 1/8 | - 6.67 |
| O | 8- 3 | 4 1/4 | NCC LEASING | - 1/8 | - 2.86 |
| O | 8- 3 | 3 | SYSTEM CAPITAL | - 1/4 | - 7.69 |
| A | 19- 3 | 10 3/4 | U.S. LEASING | - 3/4 | - 6.52 |

### PERIPHERALS & SUBSYSTEMS

| EXCH | 1970 RANGE | CLOSING PRICE | | WEEK NET CHANGE | WEEK PERCENT CHANGE |
|---|---|---|---|---|---|
| N | 62- 23 | 23 3/4 | ADDRESSOGRAPH-MULT | - 7/8 | - 3.55 |
| O | 15- 7 | 8 1/8 | ALPHANUMERIC | - 1/4 | - 7.41 |
| N | 48- 13 | 16 1/4 | AMPEX CORP | - 3/8 | - 2.26 |
| A | 34- 5 | 6 1/2 | ASTRODATA | - 1/2 | - 7.14 |
| O | 11- 3 | 8 | BOLT,BERANEK & NEW | - 3/4 | - 11.11 |
| N | 14- 6 | 6 1/2 | BUNKER-RAMO | - 1/4 | - 3.70 |
| A | 33- 13 | 15 3/8 | CALCOMP | - 1 1/8 | - 6.82 |
| O | 11- 4 | 4 1/4 | COGNITRONICS | - 1 | - 19.05 |
| O | 12- 4 | 6 1/8 | COLORADO INST. | + 1 1/8 | + 22.50 |
| O | 36- 8 | 10 | COMPUTER COMMUN. | - 1/2 | - 4.76 |
| A | 12- 3 | 4 1/8 | COMPUTER EQUIPMENT | - 3/8 | - 8.33 |
| A | 28- 13 | 16 3/4 | COMPUTEST | + 3/4 | + 4.69 |
| A | 35- 7 | 8 | DATA PRODUCTS CORP | --- | ---- |
| O | 23- 6 | 6 1/2 | DATA TECHNOLOGY | - 1 1/4 | - 16.13 |
| O | 13- 5 | 6 1/4 | DIGITRONICS | --- | ---- |
| N | 40- 7 | 8 | ELECTRONIC M & M | - 4 | - 33.33 |
| O | 8- 3 | 4 3/8 | FABRI-TEK | - 1/4 | - 5.41 |
| O | 17- 2 | 2 1/2 | FARRINGTON MFG | - 1/4 | - 9.09 |
| O | 20- 6 | 6 | INFORMATION DIS | - 1/2 | - 7.69 |
| A | 67- 17 | 17 | MARSHALL INDUSTRIES | - 1 3/8 | - 7.48 |
| A | 84- 15 | 18 1/4 | MILGO ELECTRONICS | - 1/8 | - 0.68 |
| N | 87- 21 | 21 7/8 | MOHAWK DATA SCI. | - 1/8 | - 0.57 |
| O | 52- 15 | 15 1/2 | OPTICAL SCANNING | - 1 1/2 | - 8.82 |
| O | 17- 4 | 4 3/8 | PHOTON | - 3/4 | - 14.63 |
| O | 4- 1 | 1 5/8 | PHOTO-MAGNETIC SYS. | - 1/8 | - 7.14 |
| A | 42- 19 | 20 1/8 | POTTER INSTRUMENT | + 5/8 | + 3.21 |
| O | 25- 9 | 9 1/4 | PRECISION INST. | - 2 | - 17.78 |
| O | 83- 15 | 15 | RECOGNITION EQUIP | -12 1/2 | - 45.45 |
| O | 34- 5 | 5 1/4 | REDCOR CORP. | - 1/2 | - 8.70 |
| N | 29- 8 | 8 1/4 | SANDERS ASSOCIATES | - 1/2 | - 5.71 |
| O | 53- 7 | 7 | SCAN DATA | - 3 | - 30.00 |
| O | 23- 10 | 13 1/2 | TALLY CORP. | - 1/4 | - 1.82 |
| N | 25- 11 | 12 7/8 | TELEX | + 3/8 | + 3.00 |
| O | 50- 6 | 6 1/4 | VIATRON | - 1/4 | - 3.85 |

### SOFTWARE & EDP SERVICES

| EXCH | 1970 RANGE | CLOSING PRICE | | WEEK NET CHANGE | WEEK PERCENT CHANGE |
|---|---|---|---|---|---|
| O | 6- 2 | 2 1/4 | ADVANCED COMP TECH | --- | ---- |
| A | 24- 4 | 4 3/4 | APPLIED DATA RES. | - 1/4 | - 5.00 |
| O | 18- 3 | 4 | APPLIED LOGIC | - 1/4 | - 5.88 |
| O | 8- 1 | 1 3/4 | ARIES | - 1/8 | - 6.67 |
| A | 47- 23 | 29 1/8 | AUTOMATIC DATA PRC | - 3/8 | - 1.27 |
| O | 14- 5 | 6 3/4 | AUTO SCIENCES | - 3/4 | - 10.00 |
| O | 9- 1 | 2 | BRANDON APPL SYS | + 1/4 | + 14.29 |
| O | 3- 1 | 1 1/2 | COMPUTER AGE INDUS. | --- | ---- |
| A | 12- 2 | 3 | COMPUTER APPL | --- | ---- |
| O | 14- 2 | 3 | COMPUTER ENVIRON | - 1 | - 25.00 |
| N T | 10- 3 | --- | COMPUTER INDUS. | --- | ---- |
| O | 13- 2 | 4 1/4 | COMPUTER NETWORK | + 1 1/2 | + 54.55 |
| O | 15- 5 | 7 | COMP. PROPERTY | - 1/4 | - 3.45 |
| N | 34- 7 | 9 1/2 | COMPUTER SCIENCES | - 7/8 | - 8.43 |
| O | 8- 4 | 4 | COMPUTER USAGE | - 1/4 | - 5.88 |
| A | 75- 18 | 18 3/8 | COMPUTING & SOFT | - 1 7/8 | - 9.26 |
| O | 9- 2 | 3 1/4 | COMRESS | - 1/2 | - 13.33 |
| O | 14- 2 | 3 5/8 | COMSHARE | - 3/8 | - 9.38 |
| O | 3- 1 | 1 1/4 | CONSOL. ANAL. CENT. | --- | ---- |
| O | 24- 3 | 3 1/2 | DATA AUTOMATION | - 1 | - 22.22 |
| O | 28- 9 | 9 1/4 | DATA PACKAGING | - 1/4 | - 2.63 |
| O | 6- 1 | 1 3/4 | DATAMATION SERVICE | --- | ---- |
| O | 9- 5 | 6 | DATATAB | - 1/4 | - 4.00 |
| O | 4- 1 | 2 3/4 | DIGITEK | - 1/4 | - 8.33 |
| O | 13- 5 | 6 | EDP RESOURCES | - 1/2 | - 7.69 |
| A | 11- 5 | 6 | ELECT COMP PROG | --- | ---- |
| O | 161- 31 | 38 | ELECTRONIC DATA SYS. | - 1 1/2 | - 3.80 |
| O | 20- 4 | 7 | INFORMATICS | - 5/8 | - 8.20 |
| A | 25- 6 | 8 3/8 | ITEL | - 1/2 | - 5.63 |
| O | 13- 1 | --- | LEVIN-TOWNSEND SERV. | --- | ---- |
| A | 25- 9 | 10 1/8 | MANAGEMENT DATA | - 3/4 | - 6.90 |
| O | 8- 2 | 2 1/2 | NAT COMP ANALYSTS | - 1/2 | - 16.67 |
| O | 12- 3 | 7 | NAT.COMP. SERV. | - 1 1/2 | - 17.65 |
| N | 54- 13 | 15 1/2 | PLANNING RESEARCH | - 1 | - 6.06 |
| O | 27- 9 | 11 1/2 | PROGRAMMING METHODS | + 1/2 | + 4.55 |
| O | 5- 2 | 2 7/8 | PROGRAMMING & SYS | - 1/8 | - 4.17 |
| O | 33- 3 | 3 1/4 | PROGRAMMING SCIENCES | - 1 | - 23.53 |
| N | 22- 2 | 2 7/8 | SCIENTIFIC RESOURCES | - 3/8 | - 11.54 |
| O | 2- 1 | 1 | SOFTWARE SYSTEMS | --- | ---- |
| O | 27- 6 | 6 | TBS COMP CENT INC. | - 2 | - 25.00 |
| O | 4- 2 | 2 1/2 | UNITED DATA CENTER | - 1/2 | - 16.67 |
| N | 99- 19 | 22 3/8 | UNIVERSITY COMP. | - 2 1/4 | - 9.14 |
| A | 20- 5 | 5 3/4 | URS SYSTEMS | - 1/4 | - 4.17 |
| O | 13- 3 | 3 5/8 | U.S. TIME SHARING | - 1/8 | - 3.33 |

## *Earnings Reports*

**KEYDATA CORP.**
Nine Months Ended April 30

| | 1970 | 1969 |
|---|---|---|
| Shr Loss | $.49 | $1.14 |
| Revenue | 3,303,000 | 1,787,000 |
| Loss | 725,000 | 1,282,000 |
| 3 Mo Shr (Loss) | ($.09) | ($.32) |
| Revenue | 1,207,000 | 652,000 |
| Loss | 194,000 | 383,000 |

**COMPUTING & SOFTWARE INC.**
April 30

| | 1970 | a1969 |
|---|---|---|
| Shr Ernd | $.65 | $.47 |
| Revenue | 39,398,000 | 34,804,000 |
| Earnings | 2,986,000 | 2,123,000 |

a-Restated to include companies acquired on a pooling-of-interests basis.

**SCIENTIFIC RESOURCES**
March 31

| | 1970 | c1969 |
|---|---|---|
| Shr Ernd | ..... | a |
| aRevenue | $23,411,818 | $18,219,169 |
| Spec Chg | b963,060 | ..... |
| Earnings (Loss) | (2,044,699) | 272,075 |

a-From continuing operations. b-Loss on sale of subsidiary. c-Restated to reflect business operations discontinued subsequent to March 31, 1969. e-Common share earnings not calculated, as preferred dividend requirements exceeded net income.

**DATA PRODUCTS CORP.**
March 28

| | 1970 | a1969 |
|---|---|---|
| Shr Ernd | b$.26 | $.34 |
| Revenue | 45,262,000 | 36,397,000 |
| Earnings | 1,642,000 | 2,062,000 |

a-Year ended March 29, 1969. b-On a greater number of shares outstanding. Excludes extraordinary gains amounting to 2 cents per share in 1970 (from the sale of a building) and $1.62 per share in 1969 (principally from the sale of stock in a former subsidiary).

**ELECTRONIC COMPUTER PROGRAMMING INSTITUTE, INC.**
March 31

| | 1970 | a1969 |
|---|---|---|
| Shr Ernd | $.04 | ..... |
| Revenue | 881,720 | ..... |
| Earnings | 27,000 | ..... |

a-Last year's figures are being recast to reflect an accounting change to record income from the sale of franchises only as it is received.

**DATA INSTRUMENTS CO.**
March 31

| | 1970 | a1969 |
|---|---|---|
| Shr Ernd (Loss) | ($.20) | ..... |
| Loss | 461,721 | ..... |

a-This report is unaudited. There are no comparable operating figures for 1969.

**NATIONAL COMPUTER SYSTEMS, INC.**
April 30

| | 1970 | 1969 |
|---|---|---|
| Shr Ernd (Loss) | ($.07) | $.04 |
| Revenue | 778,000 | 645,000 |
| Earnings (Loss) | (34,000) | 18,000 |

**EFFICIENT LEASING CORP.**
Six Months Ended Feb. 28

| | 1970 | 1969 |
|---|---|---|
| aShr Ernd | $.21 | ..... |
| Revenue | 1,214,074 | 768,323 |
| Earnings (Loss) | 109,293 | (2,191) |

a-Earnings per share are based on the weighted average number of common shares outstanding during each period. No dilution to earnings per share would result from conversion or exercise of outstanding debentures, warrants or options.

**GRANITE MANAGEMENT SERV.**
Three Months Ended May 31

| | 1970 | b1969 |
|---|---|---|
| aShr Ernd | $.22 | c$.21 |
| Revenue | 10,164,000 | 7,968,000 |
| Earnings | 587,000 | 516,000 |

a-Based on common and common equivalent shares. b-Restated to include acquisitions on a pooling-of-interests basis. c-Adjusted for a 3% stock dividend in August, 1969.

**BETA INSTRUMENT CORP.**
Three Months Ended March 31

| | 1970 | 1969 |
|---|---|---|
| Shr Ernd (Loss) | ($.08) | ($.08) |
| Revenue | 426,619 | 202,802 |
| Loss | 81,931 | 61,862 |

Effective Jan. 1, 1970, the company changed its accounting policy with regard to expensing product development costs and certain direct marketing expenses for leases. If the company had been consistent with prior years, the net loss for the three months ended March 31, 1970, would have been increased by $101,415 or 10 cents per share.

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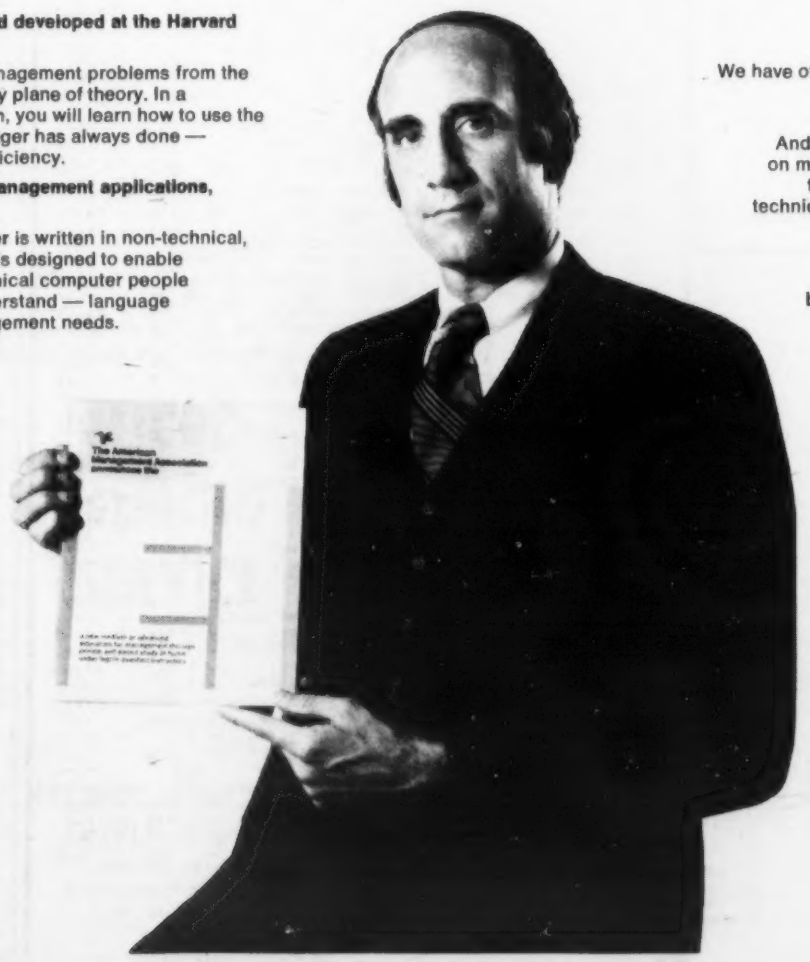
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